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Apr 1-5—American Nuclear Electrical Engineers Southwest District Meeting on "Electricity in Aircraft," Baker Hotel, Irvine, Tex.

Apr 1-5—Meeting of Automotive Engineers national aerospace meeting, secondary production firms and aircraft companies, Anaheim, Calif.

Apr 1-5—Meeting of American Society of Mechanical Engineers, New York, N. Y.

Apr 1-5—Application of Surface Coatings Conference, sponsored by National Research Institute for Corrosion of Metals, Kansas City, Mo.

Apr 2-6—American Society of Mechanical Engineers national conference, Hotel Warwick, Philadelphia.

Apr 2-6—1968—AAS—Aerospace Association, Dallas, Hotel Chicago.

Apr 18-19—Felt—Annual Meeting—Industrial Research Conference, sponsored by Felt Research Center, Foundation Hotel, Sheraton, Chicago.

Apr 18-20—Annual Meeting of the Southern Section of the Engineering Engineers Association, Sheraton Hotel, Chicago.

Apr 22-25—American Association of Airport Engineers 20th annual convention, Hotel Gateway Cleveland Ohio.

Apr 22-25—Meeting of Aerospace annual report meeting, Fairbanks International Airport, Baltimore, Md.

Apr 26-27—Students of the Aeronautical Society of America, Student Council, Georgia Institute of Technology, Atlanta, Georgia.

Apr 28—1968—45th Annual of Aeronautical Weight Society, 1968 national conference, J. Edgar Hotel, San Diego.

May 2-3—Aero-Thermal Conference, of the American Society of Space Engineering, Hotel Radisson, Minneapolis, Minn.

May 2-3—Fourth Annual National Forum of the American Endospore Society, Sheraton Hotel, Chicago.

May 3-5—South Atlantic Institute of Aeronautical Sciences, West Coast Motel Conference, Los Angeles.

May 3-5—1968—American Symposium on Flight Test Instrumentation sponsored by Instrument Society of America, Bell Aircraft Corp., General and Taper, Dayton, Ohio.



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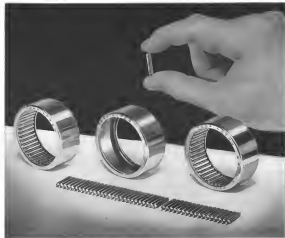
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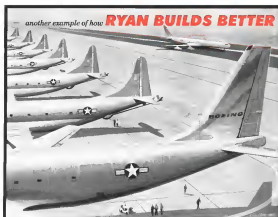
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B-52 Gives SAC More Power, Headaches

An exclusive report details the problems and methods encountered in USAF's integration of the Stratofortress.

Aerojet Builds New Missile Rocket Plant

New rocket engine test stands capable of handling 1.5 million lb. thrusts near completion in California hills

Bell Reveals Plans for Turbine Helicopter

Triple engine craft will carry 25, New York Airways shows strong interest, military support is slight.

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COVER: Boeing's B-52 Stratofortress, the aircraft designed to bring the jet age to USAF's intercontinental striking force, has one West Coast warplane wing on training mission. For an exclusive report on the integration of this giant bomber into the Strategic Air Command, see page 35.

48,473 copies of this issue printed

AVIATION WEEK • MARCH 15, 1956 • Vol. 46, No. 12
 Member APE and AEC

Lessons of the Hebert Hearings

The aircraft industry lives in a goldfish bowl and should act accordingly. This is the most important lesson to be learned from the recent Congressional investigation conducted by a House armed services subcommittee headed by Rep. Edward Hebert (D-La.). This is a lesson the aircraft industry should have learned long ago, but it was apparent from the behavior and testimony of some company officials that this fact is not yet fully acknowledged as a management guide.

Mr. Hebert was looking for any evidence that might indicate aircraft manufacturers' profits were out of proportion to the services they rendered. On this score Mr. Hebert's search was unfruitful. However, with few exceptions, the industry missed a fine opportunity to get off the defensive and use their very real problems in doing business with the government before an influential group that might help in seeking redress.

Aircraft corporation presidents who discussed the Hebert hearings and sent subcommittees to Capitol Hill did neither their own firms nor the cause of their industry any service.

There are some danger signals that appeared during the Hebert hearings that managements would do well to heed. The proper scale of overhead expenses chargeable to government contracts will continue to be a bitter bone of contention. Lack of uniformity between Air Force and Navy in allowing management bonuses to be charged off against government contracts is sure to draw further criticism from Congress and strong recommendations for a new policy. The accumulation of a sizable contingent of retired Army, Air Force and Navy officers on a government contractor's payroll will certainly provide a large degree of vulnerability to firms that indulge in this practice.

Although the Hebert subcommittee scrutinized other overhead items, including contributions to trade associations such as the Aircraft Industries Assn., engineering scholarships, contributions to educational institutions and advertising costs, there is no indication of any policy change recommendations on these items. Again the industry lost a fine opportunity to explain publicly the contributions to national welfare made by these educational donations and its accuracy for advertising.

More Probes

There will be more Congressional investigations of the aircraft industry and its contributions to the national welfare. At least three more Congressional groups are already doing staff work on aircraft appropriations, and industry leaders can look forward to the certainty of more appearances on Capitol Hill before the Presidential election. These appearances are not an odious task to be sloughed off on subordinates but a fine opportunity to report on the state of the industry and as their individual firms to the American people, who are, in the final analysis, the most important stockholders the industry has.

With the lessons of the Hebert hearings behind them, we earnestly expect aircraft industry management to emphasize a firm, factual and aggressive policy of periodically reporting to the American people and conducting these individual corporate affairs in a manner that can stand the full glare of public inquiry when required. Any other policy will deny the industry the opportunity for national growth it needs to do its job effectively.

—Robert Hets



Photos, top to bottom: Boeing B-52 Stratofortress, B-47 Stratojet, and "T107" Jet transport. All of these sleek, swept-wing jets utilize Macwhyte "Hi-Fatigue" control cable.

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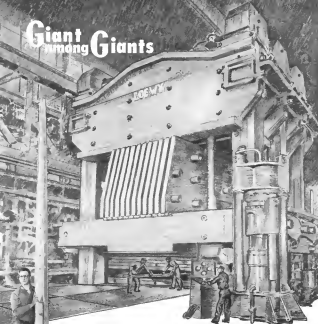
Perhaps this was due, in some industry sources bitterly charge, to slattery and insouciant briefing by their trade association leaders in Washington. Perhaps it was due to the fact that some managements are overly timid in seeking frank discussion of their problems with government customers. At any rate, for the most part they played a strictly defensive game. It remained for William Allen of Boeing, as we pointed out in our issue of March 5 on page 20, to take the offensive and use the opportunity afforded by the Hebert hearings to present the industry's case in frank and realistic fashion.

There is evidence that Congress will listen sympathetically to proposals to abolish the vague and capricious standards of the independent Research and Development Board and establish a clear, uniform profit limitation on government business that will safeguard the taxpayer and give the individual firms that deliver sound products on time a satisfactory margin for financial growth.

Industry's Task

There is a continuing need for the spirit and tactics displayed by Mr. Allen if the aircraft manufacturing industry is to free itself from many of those government-imposed, growth hindering shackles. This is a task that cannot be done effectively by paid propagandists hired temporarily for a national-scale "know" job. It must be done by the leaders of the aircraft industry who can speak authoritatively from the knowledge and conviction of their own experience and the strength of their firms. The

Giant among Giants



Today three new giants at Wyman-Gordon! Among them the largest single machine ever constructed — a 50,000-ton closed-die forging press — is now producing larger forgings with thinner sections and closer tolerances than ever before. Companion giants include 35,000-ton,

18,000-ton, 7,000-ton presses representing the greatest forging press capacity assembled under one roof in the world — 110,000 tons ready to meet the demands of industry today and tomorrow. Wyman-Gordon, greatest name in forging — in "Keeping Ahead of Progress".

WYMAN-GORDON COMPANY

Established 1893

FORGINGS OF ALUMINUM • MAGNESIUM • STEEL • TITANIUM
WORCESTER 1, MASSACHUSETTS
HARVEY, ILLINOIS DETROIT, MICHIGAN

WHO'S WHERE

In the Front Office:

Clarence W. Luffness, executive vice president, General Electric Co., N. Y., with continuing overall responsibility for Electro-Atomic and Defense Section groups.

George W. Hildebrand, formerly special assistant to the Director of the Office of Aeronautics Safety of CAA, has joined National Airlines, Inc. as its executive secretary.

Monroe Muller, vice president general manager, Army Service Corporation of Gulf Stream, Culver City, Calif.

Edward C. Light, vice president Research and Quality Division, and a director, has joined General Electric Co., South Plainfield, N. J. Harold B. Smith, vice president special administration, Generalized Air Lines, Inc., Los Angeles, Calif. has joined Lockheed Aircraft Corp., N. Y.

Mr. Gen. Victor E. Kermadec, former USAF Deputy Inspector General, returned by Pan American World Airways to direct on jet operations.

Alan F. Thompson, vice president-manufacturing, Army Division of American Bosch Armament Corp., Garden City, N. Y.

Constance Charles D. Minkler, assistant to George E. Stoll, vice president and group executive of Bendis Aviation Corp.

Honors and Elections

William A. McRae, senior partner of William A. McRae and Co., a director of Lockheed Aircraft Corp.

Gen. Nathan F. Twining USAF Chief of Staff, to receive the 1950 General William Mitchell Award of the Aviation Post No. 743 of the American Legion on April 11.

Andrew E. Shea, president of Foreign Investment Co., president of the United States Government. In recognition of Mr. Shea's and Foreign's contribution to the development of commercial aviation in Britain.

Changes

Albert L. Vassaro, general manager, Denair Division, the Martin Co. also, William C. Pardy, chief engineer, Charles B. Wilbert, manager service and test, William G. Becker, manager customer relations, Robert N. Huber, manufacturing manager, Robert G. Swann, master planning manager, Ben G. Andrews, industrial relations manager, Thomas F. Blacklock, plant controller, Ross B. Blacklock, procurement manager, Hugh F. Campbell, quality control manager.

Dr. Robert F. Brinkley, head of the air dynamo group, General, Farnham (Calif.) Division.

Col. Howard M. McGee, on the staff of the Computer Systems Division, Rome Air Development Center, Los Angeles, Calif.

Harry F. Kuesche, chief of manufacturing and Col. Harold J. Cooney, production and engineering consulting, Aircraft America, Inc., Greenville, N.C.

Joseph J. Langford, manager Air Force contracts, National Instrument Corp., Elm Street, N. Y.

INDUSTRY OBSERVER

► Highest thrust ever produced by a single rocket motor of any type—liquid or solid propellant—has been achieved with a solid-propellant charge developed by the Rocket Fuels Division of the Phillips Petroleum Co. Essential use of the rocket will be in booster applications. First stage boosters for intercontinental ballistic missiles, now producing thrusts as low as million pounds, are liquid-propellant "thrust" motors. Thrust of the Phillips unit must be well over the 125,000-lb. level required for these individual ICBM engines.

► Sir John Slessor, Britain's former chief of air staff, is advising the British government to produce U. S.-designed aircraft under license. He would like to see Britain buy manufacturing rights to one of the Century series (F-100, etc.).

► Best bid to maintain the world speed record for the United States is the Lockheed F-104A powered by a General Electric J79 turbojet. The production version F-104A has a reported speed/altitude capability in the 1,250 mph range.

► Embert Airborne has bought 32 Convair Model 440 Metropolitan transport for delivery beginning early in 1957. Purchase reflects Embert's immediate equipment requirements to meet competitors' new routes authorized last year by Civil Aeronautics Board.

► Bell Aircraft Corp. Helicopter Division has test flown a new gun turbine-powered helicopter of the Army's Camp Belvoir, Ala., aviation center. The new model is powered by French Artouste turbojets.

► Extensive work management study of the Royal Air Force is scheduled after the next few years in an effort to improve its efficiency.

► Capital Airlines' Viscount turboprop which crashed in late February while landing at Chicago Midway Airport may be rebuilt if Volo-Aeromarine can ship fuselage pieces across the Atlantic. The fuselage split vertically below the cockpit as a result of belly impact. Long delays in obtaining a replacement skin support to proposals that the transport be repaired and returned to service.

► Royal Air Force tail, from which will operate during the forthcoming atomic tests in the Monte Belle Islands will use Canberra, Vickers and Shackleton aircraft and Westland S-55 helicopter. Valiant bombers also are to be engaged to the tests.

► Air Research and Development Command's Atmospheric Analysis Laboratory at the Cranbridge, Mass., Research Center will begin sequencing USAF flight planning procedures in July. The new procedures will adapt present pattern navigation to the higher altitudes now attainable, set up a continuous forecasting system for flight operations and meteorologists, divide flight planning work load into tactical and do flight planning techniques into the upcoming jet traffic control situation.

► First Douglas all-weather B-66 tactical bomber, powered by two Allison J71 turbojets and capable of delivering nuclear weapons, has been delivered to the 17th Bomb Wing of Tactical Air Command's Ninth Air Force at Hurlbert AFB, Fla. B-66 is designed to operate at speeds of 600-700 mph and altitudes of over 40,000 ft.

► First trials of a prototype liquid-oxygen breathing system in a British aircraft are now under way. Tests, sponsored by the Ministry of Supply, are being carried out on a Meteor NF-11 with a system made by Noncollair Ltd. A Cauborn B-3 will be used in later tests.

► Italian Air Staff is evaluating Britain's Short Seacreeper anti-submarine aircraft for possible use in the Italian air force.

the new
MODEL 73

JET MENTOR

N134B

by
Beechcraft

BEECHCRAFT has designed and built another understanding military trainer at its own expense and risk—and now offers it to the military services throughout the free world as the World's Most Economical Jet Trainer.

The Model 73 Beechcraft Jet Mentor is based on the famous Beechcraft T-34 Mentor in daily use by the military forces of the United States and many foreign countries.

In flight and handling characteristics the two airplanes are so alike that transition from one to the other will be a very simple step for a student, or in fact the student could start his training with the Jet Mentor without previous flight experience. Inquiries are invited.

The Beechcraft Model 73 Jet Mentor PERFORMANCE AND SPECIFICATION DATA (Engine: Continental J65-3-9 Turbojet)

| | |
|-------------------------------|--------------|
| Cruising Speed | 345 mph |
| High Speed (at 15,000 feet) | 395 mph |
| Staring Speed | 500 mph |
| Service Ceiling | 38,000 feet |
| Range (maximum with reserves) | 450 miles |
| Gross Weight | 4,571 pounds |
| Empty Weight | 3,925 pounds |
| Useful Load | 1,386 pounds |
| Load Factor (ultimate) | 11.35 G's |
| Rate of Climb | 1,400 fpm |

Beechcraft

Beech Aircraft Corporation, Wichita, Kansas, U. S. A.

HSR-BULES: T-34 Trainers for the USAF and USA: 1-33 Trainers for the U. S. Army, the Model 73 Jet Mentor, MD-3 Multi-Engine Power Generators, and for Russia in the Beechcraft Super 18 Bomber Trainer, the Beechcraft Twin Ranger and the Beechcraft Bonanza.

Washington Roundup

Defense Profits Reports

The staff report of the House Appropriations Military Subcommittee on profits and policies with regard defense contracts is due for release this week.

The investigation was launched a year ago after Rep. George Mahon (D-Tex.), subcommittee chairman, declared in a floor speech that the taxpayers are being taken "for a merry ride" by the excessive profits permitted by the businessmen who dominate the Defense Dept. staff.

Along with the staff report, the subcommittee will release printed hearings of executive sessions held with Secretary of Defense Charles Wilson, Secretary of the Air Force Donald A. Quarles, and other officials on profit and contract practices.

Airpower Investigation

The plan of the special Senate Armed Services Sub-committee set up to investigate the accuracy and guided missile programs now is to start work in April with executive sessions, followed by public hearings in Washington, and then to hold public sessions at aircraft industry centers on the West Coast and other parts of the country.

The subcommittee, headed by Sen. Stuart Symington (D-Mo.) includes Sen. Fleeter Jackson (D-Wash.), Sen. Sam Ervin (D.N.C.), Sen. Lamar Smith (D-Texas), and Sen. James East (R-Ill.).

Twier Hamilton, 45, the control for the subcommittee, has been a trial lawyer for the past 10 years with the New York firm of Clerp, Gottlieb, Friendly and Jacobson. Born in Missouri, he was graduated from the University of Missouri, attended Oxford University in a Rhodes scholar, and subsequently worked law in Kansas City as a member of the firm of Weston, Egan, Marshall and Engage, until 1938.

As a Special Assistant to the U. S. Attorney General, he dealt in antitrust cases and later became head of the Justice Department's war funds section. In 1941, Hamilton became chief of the nuclear branch of the Foreign Economic Administration with the responsibility for eliminating the economic and industrial strength of Germany and Japan.

In 1945-46 he served on the staff of Lie Geo. George Shuford, then assistant general counsel of Army Air Forces in the Glenn-Burner Theater. He again worked briefly as an assistant to the Attorney General on antitrust matters before joining the New York law firm in 1946.

Renegotiation Approved

Renegotiation was given a pat on the back by the House Appropriations Committee in approving Renegotiation Board's covering budget, the committee declared that "the work of the Board continues to be effective as evidenced by the total deductions of excess profit before federal tax credit of an excess of \$350 million to date."

Celler Politicking

Senators of the House Judiciary Subcommittee looking into monopolistic practices in air transportation are misled by sharp clothes between Chairman Emanuel

Celler (D-N.Y.) and Rep. Kenneth Keating (R-N.Y.) seeking Republicans.

In branching into a probe of the relationship between Civil Aeronautics Board and Air Transport Union, Keating charged, Celler "is going for a ride" and having a "political field day." He was cut off by a bang of Celler's gavel. The numerous criticisms of ATA and airlines occupied from the anti-trust statutes certainly in debate review by the policies subcommittee, Chairman Celler insisted.

Traffic Controllers' Society

Plans have been laid for organization of a national professional society of air traffic controllers. A sponsoring group in Washington has drafted a proposed constitution and by-laws to be presented at an organizational meeting. Society will be called the Air Traffic Control Association.

Society will be called the Air Traffic Control Association. Objectives will be to promote, maintain, and enhance the status of the air traffic controller, to develop and disseminate knowledge of the control of air traffic, and gain greater acceptance and recognition as a profession.

Membership will be drawn from Civil Aeronautics Administration and military personnel who are actively engaged in the field of air traffic control.

Powerplants

Which for increased effort to speed powerplant development of Dr. Clifford C. Buehler, residing in his position as Assistant Secretary of Defense for Research & Development. He told a recent Cleveland meeting of the Institute of Aeronautical Sciences that powerplant design is lagging far behind aircraft design, as contrasted to eight or ten years ago. And, he said, "these advance positions in the scale of progress should be reversed."

The reason, new propulsion ideas are essential to help solve the VTOL and STOVL problems.

New D.C. Airport

Senate Commerce Committee has put off for two weeks action on a report directing Commerce Department to construct a second airport for the nation's capital at Bowie, Va., and have it finished in two and a half years.

Over the protests of Sen. Mike Monroney (D-Okla.), the committee went along with the report of Maryland's Sen. John Butler (R) to give him additional time to develop information supporting the use of Baltimore's Friendship as the alternative Washington airport instead of constructing a new one. Over the past five years the Maryland delegation has led in killing off plans for the airport at Bowie.

Dispersal Complaint

New congressional airport dispersal of new aircraft and missile plants is being emphasized by labor center International Association of Machinists says dispersal is making sense from low wage areas and changes that they are trying to establish pay rates below industry pattern.

—Washington staff



CROSSWIND LANDING GEAR cranks Stratofortress down runway at steep angle, gives pilot better feeling for its moving sideways.



B-52, now wing-by-two, outpaces flight-line counterparts in Castle AFB new dock.



THESE NOSE DOCKS can be dismantled for air support, and 517th B-111s can.

B-52 Gives

Strategic Air Command

By Richard Sweaney

Castle Air Force Base, Merced, Calif.—Being a B-52 Stratofortress, the long sought-for B-36 replacement designed to peak the USAF's intercontinental capability into the 21st age, is slowly being phased into Strategic Air Command operations here, bringing with it more power and, at the same time, greater problems in the areas of manpower, maintenance, training and operations.

Concomitant learning to handle the giant, nightjet located at this base in California's San Joaquin Valley are greatly enhanced. The \$1 billion B-52, they say, is being delivered with knee bags and more built-in operational creps before than they've ever seen before.

Crew Problem

But SAC's problems begin with the crew himself.

• How best to train them when each flying hour costs in the neighborhood of \$10,000?

• Where to find them? The difference between 10 men for the B-52's wing and 32 for a B-36 wing creates a gap which must be filled down the crew of B-47 medium bombers. At the same time, SAC planners have to see that the spinning off of B-47 crews does nothing or as little as possible to impair the efficiency of its medium bomber striking force.

Thus far—the first Stratofortress was delivered to the Air Force in June—the



PILOTS SAY MC-8 postal process cut 100% loads left out of weapons bay, but between approach of supersonic missiles.



Air Force More Authority, Headaches

faces maintenance, manpower problems in Stratofortress integration.

planned and training officers have managed to put together one operational B-52 wing. A second wing has entered the training pipeline with about half of its needed 30 crews already graduated from the training program here. Less than 50 of the aircraft are in operational service at this juncture base, but others are being in status test programs.

Now equipped with the B-52s are the 91st Bomb Wing, stationed a B-47 wing, headquartered in Berg, Calif., and the 4017th Combat Crew Training Squadron commanded by Col. William R. Smith.

The 91st is a combat unit, the 4017th a training organization for new B-52 crews.

The 4017th, assigned on paper to Headquarters 15th Air Force, March AFB, Calif., is attached to the 91st Wing, and Gen. Eshbach's orders are to place the emphasis on producing new crews rather than sharpening his wing to combat status.

Training Schedule

At present, eight new B-52 crews are being graduated each month, or 96 crews (two wings) per year. New in training is the 42nd Bomb Wing, Heavy (B-36), from Lansing AFB, Mich.

SAC trains its own B-52 crews, either then training by, 40-100 to the 11th Air Command, for combat status. They include:

• Those aren't new, and won't be within the near future, enough B-52s to

be up a large number in training crew manual operations.

• Training systems attached to a crew but wing systems remain training in combat places rather than stripped down training.

Time counts too. SAC feels that in coming years should know how to operate current spread equipment and proceeds from there to accomplish over all development of an integrated crew for a complex weapon system.

In use at Castle are the B-52A, B-52B and B-52C. They are aircraft which, according to the pilots, entering their engines in performance and reliability, and the Pratt & Whitney J57 has been operational, several years in a variety of operations.

Pilots have taken the place well over 50,000 ft., pushing to the limits of the J57, which creates a companion still problem above that point.

Pilots feel the aircraft's stability in low speeds. General effectiveness, using

the aerodynamic air brake system in low altitudes (only allows air on the plane but in small there have been trouble (value of being) is repeated encounter in low speeds in well in high. Manoeuvring, even on final approach, above what would be expected of an aircraft the size. Pilots report the B-52 a better (more stable, more controllable, more responsive) but aerial refueling than the B-47 despite the striking in let's location above and behind the pilot.

The B-52, in light (others from a training) weight, rise in the middle part of the same speeds as the DC-8 and DC-7.

So far, several thousand hours have been logged on B-52s during 1964, with training status, and 4017th team round status. The F-16 crash which took the lives of Col. Patrick Fleming, deputy commander of the 91st Bomb Wing, and an instructor pilot, was the first Stratofortress crash at Castle, and steps have been taken to remedy the defect (AW March 5, p. 21) which caused the crash.

The 4017th has a 10 week course for new crews. Acceleration, simulation, visual, and aerial flight practices are blended to train set, at graduation, groups of six men who can operate the B-52 weapon system in all reports safely and without distraction.

Once a crew reaches the second flight stage, missions possibly are planned on a three day cycle. One day is given over to ground and operational loadings, one day to flying it and the third day

Exclusive Report

This exclusive report on the integration of the B-52 into the Strategic Air Command was prepared by Richard Swanson of Aviation Week's West Coast Bureau who spent a week at Castle Air Force Base to study and report on the Stratofortress training program for its crews, its operational capabilities and the new problems that have arisen through its introduction.

critique and simulator work, which is made up of two simulators and flight line work.

The 3-day day starts with an overview lecture in the plane, then moves on to briefings for personnel equipment, weapons, engine operation and a final briefing and briefing between instructors and students. The flight itself covers another eight hours and is made up of:

• Such a flight usually follows this pattern:

• **Takeoff and climb to altitude.** A review of the gunner's range and practice area.

• **RBS (Radio Bomb Sighting)** area in Los Angeles, where the practice run is scored by ground radar crews at Chaff Air Force Depot.

• **Navigation leg is flown,** with both observers taking part. Day or night, one observer works celestial navigation while the other simultaneously works a radar navigation problem.

• **Reaching leg is flown,** with both observers taking part. Day or night, one observer works celestial navigation while the other simultaneously works a radar navigation problem.

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with the Mobile Training Detachment.

There are in one building, 990,000 words of language in B-52 flight control, hydraulics, gunnery, fuel system, electrical, air conditioning, an autopilot and option test.

The aircraft has paid off, not only for accuracy, but also for maintenance and operational costs.

Last year, 350 maintenance men went through the workshop under instruction in 24 classes of 15 men each. Eighty-eight aircraft have been put through it, and 12 aircraft were flown through in January and February of this year alone. The workshop staff puts in about 3,000 standard man-hours per month.

Each crew member is given a general knowledge of the aircraft system. A detailed knowledge is required in the system pertaining to his own crew, but the overall system is not neglected.

Subjects Covered

Subjects covered and time spent on them in students are:

• **Flight,** B-52 systems, 92 hrs.; engine performance (fuel consumption, mission planning, etc.), 45 hrs.; as scheduling, 10 hrs.; instrument flying, 11 hrs.; weather (high altitude), 20 hrs.; electrical, 10 hrs.; personal equipment, two hrs.; storage field procedures, two hrs.; communications, 10 hrs.; emergency procedures, eight hrs.; a questionnaire covering these subjects, three hrs.

• **Observers,** B-52 system, 27 hrs.; performance, 23 hrs.; radar briefing, 60 hrs.; briefing and navigation, 35 hrs.; weather, eight hrs.; personal equipment, two hrs.; storage field procedures, two hrs.; communications, three hrs.; emergency procedures, four hrs.; and questionnaire, three hrs.

• **Gunnery,** B-52 system, 27 hrs.; defensive maneuvers, 110 hrs.; communications, three hrs.; personal equipment, two hrs.; storage field procedures, two hrs.; emergency procedures, four hrs.; questionnaire, three hrs.

• **ECM crewmen,** B-52 system, 27 hrs.; defensive maneuvers, 44 hrs.; emergency procedures, 52 hrs.; communications, 11 hrs.; cultural familiarization, 11 hrs.; personal equipment, two hrs.; storage field procedures, two hrs.; emergency procedures, four hrs.; questionnaire, three hrs.

• **ECM crewmen,** B-52 system, 27 hrs.; defensive maneuvers, 44 hrs.; emergency procedures, 52 hrs.; communications, 11 hrs.; cultural familiarization, 11 hrs.; personal equipment, two hrs.; storage field procedures, two hrs.; emergency procedures, four hrs.; questionnaire, three hrs.

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possibly can be accomplished. This involves an extra time slot with the openhouse until B-52. Should one training phase be short, another can be substituted for the crewmen affected by the short.

During flight training, pilots shoot about 11 loadings at various weights. Gunners get 11 loadings. There are seven ECM practice approaches and two BLS approaches.

In addition, a checkout in the use of the mission and gun is given, which sometimes shows up pilots at first when they shoot, not changing and feel the airplane is going straight. The mission goes through 20 deg. each direction on all four main guns.

Each sortie is flown under the direction of an instructor pilot, observer, ECM man and gunner. These crews have completed graduate work in addition to the regular course.

In its training program SAC has received help from ARDC's personnel problem specialists in the Air Force Personnel and Training Research Center, AFTRC. This command has established a field unit at Castle with three objectives:

• To offer assistance to the training unit on a day-to-day basis.

• Perform short- and long-range research on crew training for the B-52.

• Perform basic training research, cutting across airplanes in general (including other types) and the crew requirements for them.

During the field unit is Irving K. Cohen, a civilian psychologist. In addition, there are four research psychologists and one educational specialist.

These people in the field were and report to research areas how much of his schooling a B-52 crew member absorbs, how much he retains on months later, a year later, etc.

'Pinball Machine'

It also is their job to determine ways of increasing knowledge retention. They try to find the best way to teach the required subjects in general, what subjects should be covered in academics and how much into the subject matter instruction can go before learning drops off from increasing of student exposure to letters and retain.

They determine two most important facts—the relationship between retention of a subject and the spacing between repetitions.

One of these projects culminated in development of a "pinball machine," a B-52 questionnaire and answer game. A variety of questions can be fed into the machine, and frequent changes of the questions keeps interest high and blocks more learning from nerves in pilots playing the machine.

Fuel system management procedures on the B-52 are critical. To develop



B-52 COCKPIT simulator is accurate to last detail. Crew members begin here and move back gradually throughout training period.



LANDING GEAR section shows how crewman gets specific.



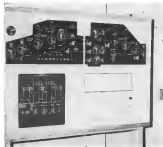
MOCKUP is used to train crew with landing gear system.



FLIGHT-CONTROLS board is used extensively in pilot training.



AIR-CONDITIONING, primary system in shown in mockup.



FUEL-MANAGEMENT board was designed by ARDC laboratory.

all in this, I'm talking about closely according to the captain's last board was back in the operations building, where pilots can practice had management where the presentation is routine.

Others contributed to the daily B-52 operations are the Operational Engineering Section's human factors unit and mechanical engineering group.

The mechanical personnel's task is debugging the systems on board, such as through the SAC, WMO, ADIC and Boeing maintenance for choosing today's legs and future flight legs which show through operations use of the airplane at wing strength.

There are similar to those at Edwards and Eglin AFBs, and Holloman AFB. Each of these locations tests a part of the weapon system as an individual unit and, to a certain extent, its flight on the various weapon system.

More some troubles going on, however, is more operational use of the current weapon system where each crew member involved has other things to think of than just the functioning of his last weapon.

It was to overcome these field bugs that SAC requested ARDC to set up a field unit at Castle.

To effect quick action on operational bugs, the unit can deal down on several levels, gather information, develop a new mission, prototype use in the wing while the paperwork still is going through channels.

This unit probably will have to perform the duties of \$77,000 a year for 1,900 hrs between changes tested of the current B-52. That time change will be made soon.

It also has recommended design for incorporation into the B-52. The unit is where should growth facilities and modifications of B-52 program.

Development of maintenance techniques for Air Force use in the B-52 is another responsibility of the unit. The current maintenance situation, most operations in a good form could be much better.

A 100-hr inspection turn takes 15 to 16 days, which could be reduced 30 to 40% if the Air Force had more maintenance technicians. Between 10 and 15 100-hr inspections are performed each month at the base, and there will require in more B-52s are delivered to Castle.

In our current maintenance situation, the unit had to deal with repair techniques involving bonded metal something new to the Air Force on these airplanes. Structural damage maintenance (thrusters, caused by fuel) was expensive effort was being in involved. The structure involved metal to metal bonds and such procedures formerly had been handled by the Boeing factory.

McNarney Tells Profits Probe Background of Convair Project

By Katherine Johnson

Washington—The engagement of Gen. Joseph T. McNarney, a top advisor of the government B-52 bomber program in president of Convair, the manufacturer of the plane, shortly after his retirement from the Air Force high-level bearings of the House Armed Services Investigating Subcommittee.

The subcommittee has completed public testimony from the 12 corporate witnesses considered. This week sessions are scheduled with representatives of the Air Force, Navy, and Transportation Board on the cost effectiveness and profit policies on military aircraft contracts.

McNarney retired from the Air Force on Jan. 31, 1952. He became a director of Convair on May 1 and president on April 1 of that year. McNarney and his convicted Flood Oilman, chairman of the Air Force, which at that time controlled Consolidated Vultee Corp. (the predecessor of Convair) at the request of the Senate investigating (D Mo.) who was then a private citizen. Speaking to the Secretary of the Air Force during the "avoids of the industry" against the B-52 program.

McNarney's contract with Convair calls for a salary of \$77,000 a year for five years, plus an escalator clause for increased cost of living. In addition, it provides for a subsequent consultant fee of \$18,000 a year for a period of 10 years.

Should he die during this time, his estate would receive \$5,000 a year. In 1954, he received approximately McNarney's salary was reduced to \$62,700.

His friends added to the contract for a contract for a "consultant" fee of \$18,000 a year for a period of 10 years. McNarney's salary was reduced to \$62,700.

His friends added to the contract for a contract for a "consultant" fee of \$18,000 a year for a period of 10 years.

New Missile Names

USAF's second intermediate ballistic missile is called Titan and the EXAF intermediate-range ballistic missile is named Titan.

The existing Titan, to be developed by Martin Co. in its own Denver, Colo. plant, has a different configuration than the first Air Force ICBM project, the Atlas, but will use essentially the same components. After it has been developed by General Division of General Dynamics Corp. in San Diego, Calif.

Smaller Titan, long developed by Douglas Aircraft Co. in Santa Monica, Calif. (AWF Feb. 27, p. 34), will have three intermediate components. General Dynamics Co. is the prime contractor. North American Aviation Inc., Yorktown, A. C. Springfield, Division of General Motors Corp. for guidance. All major components for the Titan will be derived from ICBM systems.

The plan to use some components in Atlas and Titan makes USAF to conduct advanced technical approach simultaneously at an estimated increase of only 20% over the cost of development of a single configuration. In all major performance characteristics, the two missiles are identical.

McNarney was paid a \$33,000 bonus in 1954 and a \$10,000 bonus in 1955. His total earnings from Convair from April 1, 1952, through 1955 were \$324,950.

Subcommittee questioning of McNarney occupied two days.

• **The prosecution** asks in support of the B-52 program as chief of the Air Materiel Command. McNarney said that he was "conscientiously forthright" to the program while in the Air Force.

• **Whether, as chairman** of the Defense Management Committee in former Secretary of Defense Louis Johnson, he participated in the decision to cancel the first of the Navy's representatives, the United States, and to reduce the defense budget to \$33 billion.

McNarney reported that he knew nothing of the cancellation of the carrier contract until it was an accomplished fact and that his previous view "later was" to cancel Johnson's policies, not to participate in making them.

Following a report of some of the discussion on these points, Rep. Edward Hebert (D-Calif.), chairman of the subcommittee, headed most of the questioning of McNarney.

Hebert: "Am I to understand, General, that you immediately upon your retirement, on Jan. 31, 1952, became the president of Consolidated?"

McNarney: "No, sir, that is not correct. I retired on Jan. 31, 1952. I proceeded to San Diego. I married a San Diego girl."

At that time, I thought that I still had about five good years in me and I was willing to go to work."

On the morning of my retirement, I did receive a cryptic telephone call and the question asked of me was, "Have you decided to go to work for anybody or to work for me?"

"I said, 'I have not.' I talked it



Britain Takes Over Speed Record

Great Britain's Phantoms had to fix a new aircraft on record, crossed a mile barrier last week with the measurement that a Phantom 3 (shown) has established a world speed record of 1,312 mph in two passes over a nine mile course at 75,000 ft. Prior to the flight, which broke the 1247 mph record set by a USAF F-100 last year, was Phantom test pilot Peter Twiss.

that time that I would like to go to work but that I had two requirements, one the job had to be in Southern California and the other had to be that I had to protect the man I was working for the owner's son. Well, when you get to San Diego, would you call this owner?"

Hebert: "It was an inside number. Not being too dumb, I could guess well enough."

Hebert: "Who called you, General?"

McNarney: "It was with me to identify him, it was San Diego."

Hebert: "San Diego was speaking to me for Consolidated?"

McNarney: "No. He was speaking to me. I understand that Mr. Senigaglia had been out in California. He had seen Mr. O'Brien. He had seen me in the paper and the question asked of me was, 'Have you decided to go to work for anybody or to work for me?'"

"I actually called Mr. O'Brien two days after I arrived in San Diego. He said if he could come up and see me the next day. He did. We had lunch. We discussed the question. He asked me if I was interested in the job. I said, 'Yes, but I would like to make a few commitments before I accept.' I then contacted the head of an engineering firm who was working for Consolidated, whom I knew, one of the Heller associates. I asked him up to see me."

I questioned him very closely on everything that was going on at Convair.

"I then, based on what he told me, asked four different individuals working in Convair to come out and see me. . . and five days later I made up my mind it was a job that I could take

"I then called Mr. O'Brien . . . and we came to terms."

Hebert: "You had no part in the cancellation of the superproject?"

McNarney: "No part at all."

Hebert: "Would you say there was any connection between the B-52 program and the cancellation of the United States?"

McNarney: "I just use knowledge of anything that could be the two things together."

Hebert: "Except that in some quarters it was said that the controversy arose over the conflict between the Navy and Air Force as to whether to build."

McNarney: "I know nothing about that."

Hebert: "You consented to appear as the first pilot of these airplanes, taking the contractors of the contract B-52 contract with Consolidated had nothing to do with the aircraft manufacturing employment by the Consolidated?"

McNarney: "That is correct."

Hebert: "Did you at any time ever consider that perhaps such a connection, as direct immediate connection would place you in respect?"

McNarney: "No, I was not considered."

National Air Show

The 1956 National Aircraft Show will be held Sept. 2-5 at the W. R. Rogers Field at Oshkosh City, Wis. Although full participation by all branches of the armed services is expected, they are not yet providing any details. President of the show is Frederick G. Goodrich.

that I felt that my reputation was such that a thing like that would never be charged against me."

Hebert: "In other words, you have a most high opinion of the reaction of the American public opinion?"

McNarney: "Yes."

Hebert: "As a military test with a different mind did you at any time in 1952 to Secretary Johnson the design to this contract in the of an aircraft design of operating on such a reduced budget?"

McNarney: "The evaluation of what that aircraft would do in the armed forces was the job of the Joint Chiefs of Staff."

Hebert: "Did you at any time consider it your duty as an American citizen to use your opinion for the safety of your country?"

McNarney: "I was doing my job as I saw it at the time."

Hebert: "And you, with your long record of duty, did not feel that it justified an expression of your substance on your part in the defense of this country was at stake?"

McNarney: "I always express my opinion on anything for which I have any responsibility or interest."

Hebert: "We are getting nowhere here. But I think your opinion is such that you either what you have said and I can understand you have not said anything or did not think you had said anything or anything wrong in your taking employment with a company like Consolidated in view of the previous happenings in connection with the B-52. Such an action is something, but I don't think precluded."



Northrop Aircraft, Inc., test work installed its new F-5H Scorpion (above and at left below). Set up around aircraft to carry Douglas Falcon air-to-air guided missiles as part of its standard equipment. In each of its wing pods, the F-5H carries three Falcons plus a packet of folding-fin, unguided rockets. When ready for firing, below left, the Falcon extends two extended from the side of the pod for launching. The test program included Falcon drops from both wing pods and pylons (below and left above).

New Scorpion Designed for Falcon



Congressmen to Visit Atomic-Age Navy

By Claude Wizer

Congressmen from California-Nevada that 100 members of Congress, about to pass judgment on H. R. No. 5, the 1957 budget request, will visit the Navy's new nuclear fleet before they are sent to the capitol.

If they turn out to be critical it is unlikely that they can find fault with the fleet operation or the design and construction of the hardware and electronic systems that guard the fleet, since and make it potent. It is possible that they will judge the performance of the Bureau of Administration and the aircraft industry, already indicated as a report of the House Government Operations Committee (HAWMA 12, p. 14).

A press preview last week made it clear that Navy aircraft development has not kept pace with the technological advances that have gone into support of the elements of a modern fleet or task force.

Prototype Force
In the prototype force now at Guantanamo Bay, the new USS Farnholt is accompanied by some ships and defense weapons systems in up-to-date in the carrier staff. Ready for action, the Farnholt alone represents an expenditure of close to \$180 million. Scaling it at one-third represents a total of \$60 million.

•USS Boston, first guided missile cruiser, equipped with the Convair Terrier anti-aircraft missile.

•USS Northampton, first tactical command ship carrying advanced electronic communications gear.

•USS Fawcett, the Navy's first test destroyer, built to keep pace with the Farnholt.

In the total fleet, there are 27 new ships. These include the 17,000 ton

carrier Antietam, three 45,000 ton fast frigates, the New James, Iowa and Wisconsin, two heavy cruisers, the Sides and De Moines, 15 destroyers and two submarines.

Admiral Arthur A. Burke, Chief of Naval Operations, will tell the Congressmen that a looking forward to the day when the Navy will have, after the present, task forces that include as many as three or four carriers and six missile firing cruises.

He will emphasize other new projects already disclosed and discussed at closed hearings in the past month in Capitol Hill. These include:

•Taurus, another Convair anti-aircraft missile, smaller than Terrier and proportionately more powerful. Like the Terrier, it was developed at Hughes Aircraft's Applied Physics Laboratory. It will replace five such guns in eight destroyers being sought in the Fiscal 1957 budget.

•An increase of "demon" in the manufacturing process. In addition to the Boston, the USS Cimberlin is slated for operation before the end of this year.

Admiral Burke said that further construction of atomic cruisers will grow in a concentrated and that they must be built from the keel up. In the 1957 budget, five more conversions will be sought and this type of program will continue for three to four years.

•Dry docks, plans are on the way out and must be replaced by aircraft with all weather capability. Best bet at present is the McDonnell FH-2N Demon, one of the planes that should be on the Farnholt later instead of its sister ship, the F4U Corsair. First delivery of the Convair's proposed F4U Corsair, 1,000 million hour lighter, due with the fleet in 1957, will have no alternative capability. It is anticipated it will get this capability later at some

service or performance. The Douglas F4D Skyray, like the Demon, has been delayed, along with the F4H.

•The extended landship Kentucky may be completed with guided missile capabilities. Weapons would include ballistic missiles in addition to guided missiles of the Regulus type and anti-missile protection. The ballistic missile is described as one with "insurance" capability. If the Navy desires to join this project, funds probably will be sought in the Fiscal 1958 budget.

Shipyard and most spectacular contrast to the current situation will be found in the Bureau's consideration of its capabilities with the Terrier.

Reid Allen, John H. Sides, who has been working on guided missiles since 1946, shows the experience of weapons designed for shipboard use. In a defense of segregated missile development projects, he pointed out that the ongoing environment, a risk in "limited scale" systems, which represents and isolated maintenance facilities make it essential that the system be built for this specific purpose.

Cessna Introduces New Model 182

A new concept for introducing business aircraft to prospective buyers will be tested by Cessna Aircraft Co. this month in its display of the four-place Model 182.

The plan involves a three day showing at each Cessna distributor in the U.S. and Canada. At each showing, Cessna will invite five potential buyers as well as local customers and good prospects and offer, as part of the attraction, free airplane rides. In passenger class by far.

Through such a system, the company hopes to get across the light business aircraft story to the man in the street—a segment largely ignored in recent years.

The latest airplane to join the Cessna line, the 182 is a twelve knot lag over version of the 180—and with the lighter 172 makes the company's complete transition to this class fairly complete.

Initial deliveries to customers will begin concurrently with the 182 sales program. Some 45 of the aircraft were built in February.

Priced at \$15,700, the 182 is powered by a 230 hp Continental 940-C engine and has a cruise speed at 70% power of over 150 mph. at 7,500 ft. Top speed exceeds 180 mph, sea level rate of climb is 1,100 fpm, cruise endurance is 4.5 hr.

FOR 3000 PSI PNEUMATIC SYSTEMS

SOLENOID VALVES REGULATORS INTERLOCK VALVES



Stratos' Western Branch is handling out solenoid valves and pressure regulators for 3000 psi pneumatic systems. Light, reliable, precision-built, they complement the large group of Stratos pneumatic equipment for aircraft.

Solenoid valves are made in two types, each produced as: normally closed, normally open, and normally closed with manual override. Designed for continuous duty in aircraft pneumatic systems, Stratos 3000 psi solenoid valves are compact, light, and simple to install. Drawing less than 1 amp, they are fast acting (0.020 sec) and their reliable performance remains unaffected by temperatures of -85°F to over 145°F.

Flow capacities are equivalent to a 0.040" sharp edge orifice for the direct-operated size and to 0.312" for the larger air relay type. The solenoid of the smaller model is used in the higher-flow air relay unit.

Both types are available as either complete units—or as core and seat assemblies which can be threaded into bovers integral with the mechanism to be controlled.

1500 psi. Downstream proof on this pilot operated seat is 5000 psi.

The poppet-type, medium flow regulator illustrated delivers a capacity equivalent to a .025 diameter sharp edge orifice, adjustable downstream pressure range from 100 to 800 psi., proof pressure is 1500 psi.

For more complete data on Stratos' 3000 psi solenoid valves and pressure regulators, write to: Stratos' Western Branch, 1800 Rosecrans Avenue, Manhattan Beach, California.

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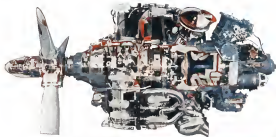
Accessory systems and precision equipment for aircraft

Victory for Furnas

Washington-Battle over control of weapons development has ended in "a clear victory" for Dr. Clifford C. Furnas, Assistant Secretary of Defense for Research and Development, some supporters of Dr. Furnas say.

Although other leaders still are somewhat skeptical, Defense Secretary Charles E. Wilson's attitude at a press conference last week has won the "clear victory" point of view. Wilson said again that he acted too hastily in naming a Feb. 21 memorandum which appeared to shift responsibility for development from Dr. Furnas' office to that of Frank D. Newberry, Assistant Secretary for Applications Engineering without first "telling" Dr. Furnas in his reasons for it. (AWMA 5, p. 27 and AWMA 12, p. 138).

Dr. Furnas, who is a top on Mar 5 in order to talk to Wilson. A source close to Dr. Furnas said that in the only personal discussion they have had to the issue. Meanwhile, Wilson's office is "analyzing and preparing" along on how to avoid the effect of the Feb. 21 memorandum—whether to withdraw it, since neither seems expediting it is against it.



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MISSILE ENGINEERING



HAUGE USAF rocket stand shown during engine test is similar to those being built by Aerojet near Sacramento. Note height of stand.

Aerojet Builds New Missile Rocket Plant

Sacramento, Calif.—Great rocket en-
gine test stands capable of handling
loads up to 1.5 million lb. are under
completion in the isolated hills 12 miles
east of here.

Testing already has begun at the
cloudy-looked site. The test facility
is part of what will be the nation's
largest rocket engine plant, planned by
Aerojet-General Corp.

Two of the giant concrete stands are
now in use. They are capable of han-
dling 300,000 lb. loads. Three more
stands are under construction. One is ob-
served for 1.5-million lb. loads and will
be capable of handling the thrust out-
put of the largest rocket engines now
on the drawing boards. This will be
ready by the end of the year.

A 50-million-sq-ft propellant plant
on the 14,000-acre site is manufacturing
Rohr rockets and associated prod-
ucts for the Navy. Aerojet now is
contracting to add about \$15 million
for the liquid rocket facility. Vice
President and General Manager Wil-
liam E. Zach says several million of this
already is invested in the test opera-
tions.

While the test stands are the most
dramatic sight at the facility, there are
only a part of a sprawling plant which

Aerojet hopes will become one of the
giants of the missile engine business.

The stands are along the face of a
40-ft escarp on the eastern edge of the
property. The four stands will have
multistaging positions. Three additional
stands will serve firing positions in
the planning stage.

These are provided "close return"
stands which deflect the burning ex-
haust of large rocket engines at a 90
degree angle by means of a water-cooled
deflector plate. This method was used
by the Germans in World War II.

While construction still is underway,
firms at the site have been in the hot-
spot position. This accounts for much
of the noise and flame reported by
Sacramento area residents during 150-
600-lb. night firings.

Vertical mounting of the rocket en-
gines will produce less noise and flame
at the same power.

C-Clamp Tests Stands

The stands themselves are of con-
crete with steel superstructure. They are designed in a C-clamp
configuration to withstand the trans-
mission loads which rocket engines
capable of 1.5 million lb. thrust will
put on them. There is an exceedingly
high percentage of steel in the struc-
ture in order to take out their loads.

Despite the tremendous forces they
must withstand, the stands—like
those which Aerojet built for the Air
Force at Edwards Air Force Base—on
the ground but depend on the
C-clamp design for basic strength.

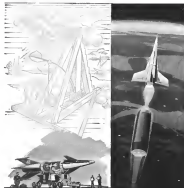
While waiting platforms of the
rocket stands are at ground level, trans-
mission ramps are necessary for truckmen
to handle the big engines which will
be tested on the 1.5 million lb. thrust
stands. Completely engines and tankage
can be tested on these structures.

The large steel deflector plate which
must bear the heat of the rocket ex-
haust are more than 15 by 20 ft in
size and are bolted into the concrete
so that the gas cannot get them off.
Water is sprayed into the fiery exhaust
under high pressure through large noz-
zles mounted in a series of holes in the
deflector plate.

Tunnels to Control Rooms

Underground tunnels connect each
stand with its control room, providing
access for personnel as well as in-
strumentation and control lines. There
will be one control room for each two
stands. These windowless bunkers are
buried under with earth on the
stand site.

There is no direct or periscope



ONE OF A SERIES—hypersonic test—Bell's X-5 hypersonic

Συστήματα Όπλων

—in Greek means weapons systems, and with the emphasis, the Greeks developed one of the earliest weapons systems. Pioneered shortly in reaching the heights of its effectiveness during the Middle Ages, today's weapons systems concepts are tremendously more complex than the ancient catapult. The Greek advances of weapons enabled only the highly integrated engineering teams to keep pace with the changes. Combined with a receptive management policy, such a team in a relatively short time can achieve a goal that once took centuries.

At Bell there is both progressive management and creative engineering teams. With that reputation, Bell is concerned not only with today's problems but with tomorrow's solutions. Backed by years of successful missile development and management, Bell is now engaged in new projects in advanced missile design. To the creative engineering team, this is an opportunity to work on a completely new weapons system. For qualified engineers with a B.S. or advanced degree, Bell is offering positions where a high level of professional achievement may be attained.



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DEVELOPMENT ENGINEERS

for Weapons Systems Engineering

- Development of detailed operational concepts and requirements for a whole weapons system.
- Team analysis and evaluation (time, costs, weight, workload, test, safety) to allow an optimum system design. Experience in team systems or product systems highly desired.

DESIGN ENGINEERS

- Establish reliability criteria for weapons systems elements, determine, measure and perform continuous analysis of a test program to yield all necessary reliability data.
- Hydraulic installations—design and layout conventional. Experience with aircraft or missile hydraulic devices desired.
- Control and instrumentation design and changes to determine of missile support equipment systems. Experience with analog, digital knowledge of electronic, hydraulic and mechanical elements in a complex system is highly desired.

PROJECT ENGINEERS

- To manage responsibility for technical coordination on weapons system requirements between project group, manufacturing/test activities and contractors.

FLIGHT TEST ENGINEER

- Establishment and coordination of instrumentation requirements for weapons systems test programs. Documentation and coordination of test safety requirements and test objectives.

comes from the control room, to the stands during firing. Closed circuit television is employed.

"We find that this does a pretty good job of watching, since it's something that might otherwise be a drawback," said Robert Young, resident manager of the liquid rocket facility.

Control Rooms

The control rooms are built in connection with IBM and Remington Rand equipment for taking, reducing and storing data. The whole system has been designed around the most up-to-date methods of instrumentation and data reduction," Young said.

One of the control rooms comes with one of the stands, due to the need for increased instrumentation on the larger thrust test stands. A few yards behind each control room is a day building, also protected by earth banks. Like the control rooms, each day building serves two stands.

Fuel Storage Area

In the immediate vicinity is a storage area for liquid oxygen and fuel gas, as is an aboveground propellant storage area. Fuel lines connect these to the stands.

For safety, leakage for the liquid oxygen under test is installed in leak wires at the bottom of each stand and leaks the stand.

In addition to the high thrust facility, Aerojet is building a 1-in. thrust test area.

This is called "the box" facility will be used to test jets, components and small thrust jets.

A buffer zone a mile in depth surrounds the one of the stands and their supporting areas. The off-instrument buildings for the plant is located about three miles from the test area. Now this is a 75,000 sq ft facility divided to compare work and test to development and fabrication. A criteria in this area will serve personnel of both the solid rocket and liquid rocket plants.

Separate Plants

In general, the liquid and solid facilities will be operated at separate plants, with a resident manager for each. Aerojet General Manager Zach has several stories to tell.

• While the liquid facility is under USAF ownership, the solid propellant plant is under the Navy.

• The liquid program is "so important" that its top management must be interrupted in concerns with other matters.

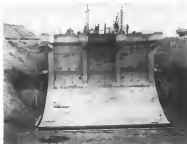
• The solid plant is in production,



AERIAL VIEW of Aerojet liquid rocket plant. Tensured hills in foreground block view



BUNKER-TYPE safety shelter built into Aerojet's Sacramento underground facility.



DISPERSED TEST STANDS in shown at the Aerojet General liquid rocket plant

Engine Simulator Speeds USAF Training

Chasco AFB, Ill.—The prototype of a new jet engine simulator is under development in the USAF's urgent effort to put speed and economy into its training programs for maintenance personnel, has been demonstrated to the Air Training Command here by Bucon-Rodgers Technical Training Aids, Inc. of Concord.

Designed to bring everything but the heat of the blast into the classroom, the Bucon-Rodgers simulator reproduces the noise of the engine, the fluxes of gas flowing through the compressor, burner, afterburner and exhaust and the flow of fuel.

The present USAF prototype is patterned after the Pratt & Whitney J57-P7.

This is the engine used in North American Aviation's F-100 Super Sabre, one of the Tactical Air Command's newest fighters. Combat engineers of the aircraft has been seriously hampered by the lack of qualified maintenance personnel.

The basic J57 engine also is flying in the Boeing B-52 long-range jet bomber and will see increasing service as the Convair F-102 interceptor and McDonnell F-101 Voodoo fighters are delivered in increased numbers.

The new Bucon-Rodgers trainer is intended to help in preparation of trouble malfunctions and engine trouble-shooting techniques as well as teach basic engine theory. It can be used by two mechanics (both flight personnel and



SIMULATOR PANEL is activated, changes color as engine gas through operating cycle, maintenance workers with the engine's operation.

As the instructor's station, there are 26 switches that can be used to set up flight conditions to introduce simulated engine malfunctions, such as flameout, overheat, fuel, system failure, fuel exhaustion and improper or irregular operation or pressure.

Logic performance for any operating condition can be accurately simulated. This includes starting, ground operation, normal or emergency flight operation and use of the afterburner.

Variables in throttle setting, altitude, air speed and temperature can be shown.

The trainer, operated on 110-volt 60-cycle alternating current, consists of three units connected by cable:

- The operator's console is a mockup of the throttle and engine controls in a jet cockpit.
- The instructor's console is a bank of controls and dials for setting up flight and emergency conditions.
- The demonstration panel, major part of the simulator, is an illuminated cross

section of the engine. It depicts in color the fluxes of air, fuel and exhaust gases going through the engine. The intensity of the lighting varies with engine temperature, and the rate of flow of the lighting varies with the velocity of the gases.

Cockpit Instruments

On the demonstration panel are all instruments found in the aircraft cockpit. These include the altimeter, air speed indicator, fuel air temperature gauge, fuel pressure gauge, fuel flowmeter, turbine temperature gauge, exhaust gas pressure gauge, turbocharger oil temperature and pressure gauges.

Also warning lights to show engine oil system, fuel pump failure, engine fire, fuel air engine oil overheat and low. These are instruments to show the simulated temperatures and pressures throughout the engine, afterburner fuel flow, air flow and thrust.

Autometers in the engine cross section show operation of the starter air valve, fuel drain valve, anti-compressor bleed valves and exhaust nozzle.

The engine engine panel is mounted on a sliding track in the main cabinet. This permits it to be raised into the cabinet for shipping or storage. The panel also can be partially actuated during operation so that the student can see such of the cockpit instruments.

The cabinet housing the demonstration panel also houses the entire computing mechanism and sound simulator. In addition, there is room to store the manuals used by the student and instructor as well as the cables. Overall size of the cabinet is three-by-four-by-eight feet.

Control of Sound

The engine sound simulator operates through a loudspeaker. It can produce several levels of starting, acceleration, use of the afterburner and shutdown, as well as abnormal sounds that cause loss of burning before or after. These can be introduced by switches on the instructor's panel.

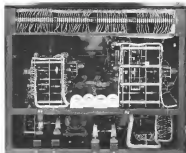
All noise levels can be adjusted as, ranging to the use of the classroom or that of cockpit.

The engine computer in the Bucon-Rodgers design is mechanical, not electronic. The calculations are made by levers and cams to compute malfunctions.

Operating procedures are the same as those for a real engine except that the time required to come to a stop has been shortened. Reaction is added by the fact that cross mode by the student are reflected in the same kind of failure he would meet in actual operation.

When he makes the mistake, the trainer will simulate a hot start, failure to start, flameout, lowest engine stage or even over-temperature.

Advantages of the simulator over an



CLOSEUP shows detail of machine's mechanical computing mechanism.



SOUND REPRODUCTION mechanism and loud speakers are housed behind entry panel.



CABINET ready for shipment or storage. Student, instructor consoles are shown at left.



INSTRUCTOR'S CONSOLE (a) shows instructor's operating conditions. Operator's console (b) includes throttle, engine controls.

NEW PANELLOC

ROTARY LATCH ADVANTAGES LISTED

BY **BELL Aircraft CORPORATION**

The next 135 words of this advertisement taken from Bell Engineers' letters

- **Elaborate Product Engineer:**
- Elastically designed doors not designed to resist the massive Rotary Latch as a great saving in space and weight, as well as the strength engineer.
- **Rotary Latch:** assembles in door or panel itself—no steel-to-steel-to-steel-up problem.
- Tests show no direct separation—door bolts with the effect of a nut and bolt assembly.
- Vibration tests also had no effect on the Rotary Latch.



- **P. P. Research, Product Engineer:**
- Rotary Latch selected because of cost savings from Bell's latest control casing (VTCR) design.
- The new location, Rotary Latch is essential for help of doors and supply of door when maximum access and opening are important design considerations.
- Its simplicity, vibration resistance, ease of installation and cost are other factors that resulted in Bell's adoption of this new feature.
- Now in use on Bell-developed aircraft, helicopters, missiles, electronic components.

Write for catalog and price list for your file

A PRODUCT OF **SCOVILL**

Scovill Manufacturing Company, 87001 Parkway Dr.
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- **Section engine mounted in a test cell**
- **Lower spending costs.**
- **Reduction of expensive equipment for critical operation.**
- **Lower move load, permitting section two while the engine is operating.**
- **Ability to disassemble, on the ground, all variations in altitude, air speed and air temperature.**
- **Ability to demonstrate malfunctions without showing an engine.**
- **Visual display of fire conditions inside the engine.**
- **Ability to demonstrate to larger drives than would be possible in a test cell.**

The Darton-Rodgers prototype, built on specifications provided by the Wright Air Development Center for a requirement complying with the Air Training Command, is at Chanute Field for evaluation.

Engine manufacturers, including General Motors and Pratt & Whitney, are studying the project and there is a strong possibility that it will be adopted for other jets. Emphasizing the use of whole engines and engines for testing purposes.

New Formula Develops Nosewheel Shimmy

A formula which accurately predicts nosewheel shimmy characteristics has been evolved by William J. Mansland, chief of the Mechanics Research Branch of the Aeronautical Research Laboratory at the Wright Air Development Center. The problem of nosewheel shimmy has been studied for 30 years without any important steps towards solution. In recent years, high landing speeds have forced an intensification of interest in the problem because they cause shimmy to build up to a damaging level even before the pilot is able to take control.

Mansland reported the traditional theory that shimmy vibrations are caused by the flexibility of pneumatic nosewheel tires which must dissipate much of the energy of the airplane's forward motion. The mathematic results of past studies indicated to him that the cause was being sought in too narrow a field. The equation used for nosewheel shimmy by the engineers of the two firms included only three parameters in which critical factors might be found: the lateral stiffness of the tire, its vertical stiffness and the length of the area from the point to the wheel. Mansland developed an equation involving 15 parameters including damping and structural variations. It indicated that the supporting structure was a more likely source of shimmy than the wheel itself and that the pneumatic tire is



MODEL for nose-wheel shanty test

actually a stabilizing influence.

To test the theory, WADC built a test model of a nosewheel with an aircraft representative shanty fixed shanty designed by Mansland. With this device it was possible to get quantitative measurements of the degree of shimmy obtained and the frequencies of oscillations occurring.

Tests made with the model showed that it was possible to get a shimmy with a rapid wheel and no tire. They also proved that Mansland's equation predicted the influence of pneumatic changes are considered by earlier analyses. The fundamental cause of the more violent forms of shimmy was found to be located in the supporting structure rather than in the wingless project.

Because of the favorable results of the model tests WADC carried out a field test program using full-scale models. A C-119 cargo plane with its regular landing gear began to shimmy at a low speed of 60 knots and the gear eventually buckled. After modifying the structure to meet the requirements of the new formula, the same airplane was found to be capable of speeds up to 120 knots without shimming.

Westinghouse to Build F4D Fire-Control Units

Westinghouse Electric's Air Arm Division has secured a \$22.7 million Navy contract for its own Air Arm 12 interceptive fire control system for installation in the Douglas F4D. The new system includes a novel electronic module packaging which enables it to fit into the core of the F4D, yet permits rapid replacement of individual components. Production deliveries are scheduled to begin this spring and continue into 1967.

NEW-Air-transportable Shelter



Take flight out of the Army's new Air-transportable Shelter.

Craig HELICOP-HUT™

One of the many types of special enclosures designed by Craig for electronic installations and other uses.



One of many possible equipment layouts

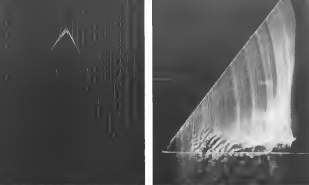
- **Lightweight**—550 pounds
- **Payloads**—up to 6500 pounds
- **Aluminum**—this located to form core supports maximum strength with minimum weight
- **Inside dimensions**—70" x 70" x 96"

Write or phone for Brochure C-3

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TIP VORTICES and flow separation on a delta wing are clearly defined by smoke streams (l) and smoke introduced at leading edge (r).

Smoke Traces Aerodynamic Patterns

"Aerodynamics would be a creek if we could only see the air."

Every student and instructor in classrooms of engineering has said that at one time or another.

The recorded history of aerodynamic sciences shows the ability of some students of air flow to "see" the streamlines and vortices as if they were opaque.

One of the basic tools for flow visualization

is the smoke tunnel, a low turbulence, slow-speed tunnel in which streamlines of a heavy smoke trace out the flow patterns over airfoils and bodies.

Among the finest examples of smoke-flow studies are those made in the Collins two-dimensional and three-dimensional smoke tunnels at the Collins Aeronautical Research Laboratory, Cedar Rapids, Iowa, under the direction of Dr. Alexander M. Lippich,

Collins Aeronautical



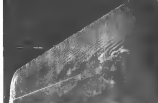
TWO-DIMENSIONAL smoke tunnel will be available for sale to high schools and colleges.



VENTURI flow patterns in sequence.



ACCELERATED flow over airfoil.



LATERAL FLOW of boundary flows can be seen in 3-D tunnel.



THREE-DIMENSIONAL Collins smoke tunnel (left), swept wing in three-dimensional smoke flow field shows vortex formation.



researchers study flow patterns with three-dimensional tunnel



SMOKE PULSES show the spreading up of streamlines in the center of the vortices, and plot a velocity distribution.



PULSE TECHNIQUE demonstrates vorticity. The acceleration of air over the upper curve of an airfoil, reducing pressure to produce lift.

MALLORY·SHARON reports on

TITANIUM



Fishery production at Malibey. Herring permits are maintaining open season with restrictions. Allow a time on wild products.

MALLORY-SHARON

steps ahead in titanium

With the acquisition of complete rolling facilities, Melroe Shorn Titanium Corporation has integrated titanium melting and mill processing . . . permitting uniform quality control throughout production, and another scheduling.

② Mullery-Sharon has joined with Atlas Steels, Ltd., to form a subsidiary company, Atlas Titaniums, Ltd., at Welland, Ontario, which will supply titaniums in bar, wire, sheet, strip, and forged forms for Canadian and world markets.

② Plant expansion now underway at Haffery-Sheron will more than double net capacity for producing a complete range of titanium and titanium alloy mill products in 1956.

Titanium, the strong, lightweight, corrosion-resistant metal in great demand for aircraft, is proving economical in more and more industrial applications. Call us for your requirements, and for technical assistance. Mallory-Baron is a leading producer of a full range of titanium and titanium alloys.

WALLOEY-SHARON TITANIUM CORPORATION, MOBILE, OHIO

MALLORY  SHARON

New Engineer Talent Goal of R.P.I. Plan

Liberal Arts graduates are now entering the engineering fields through a new educational venture undertaken by Rochester Polytechnic Institute in cooperation with the United Aircraft Corp.

The venture is another industry-education attempt to find ways of overcoming the national shortage of scientific and engineering talent.

It is in addition to (and completely separate from) the graduate studies program for applied scientists, and encompasses established by Researcher Unit fall in South V. Indus, Conn., for the south-
east New England area, following a grant of \$600,000 by United (AW Oct 24, p. 25).

Thirty-nine Pratt & Whitney students and 12 employees of Hamilton Standard, both divisions of United Aircraft, have enrolled in the study program consisting of a 30 week course to be followed by additional evening school studies.

These students almost without exception, are now employees of the United Nations.

All the students are college graduates with either a liberal arts or science degree in a field other than engineering. Upon completion of the 10-week course, they will be qualified for engineering work and assigned to jobs at Pratt & Whitney Aircraft or IBM/Spa-Standard.

The evening classes offered by Kamsel will bring successful candidates certificate crediting them to eligibility for admission to Kamsel's Graduate Division at the R.F.I. Hartford Graduate Center. If admitted to the school, they can take studies leading to a master's degree in several engineering or science fields.

Students entering the program must show academic ability and aptitude for graduate study of the highest quality and indicate a desire for careers in education and service.

Thus, this course has the potential of providing another source of supply for technology from a highly qualified group with a general rather than a specialized college education.

All the students will study fulltime until they complete the first 30 weeks of the program, at the same time drawing regular salaries from the UAC division to which they are assigned. The full cost of tuition, facility salaries and such equipment as books and dining hours will be assumed by the UAC division.

Another group of about 60 students is expected to start studying under the plan in July.



Final Form for 1649A Wing

Bartholomew... First of the large wing show seen for the 50 Lockheed 4549A transport in order is nearing completion. Rollout of the aircraft is now scheduled for August, the first flight in October.

10. The longest dimension along the 150 ft. (10 ft. x 15 ft.) spans 150 ft. and is being assembled in a single unit in a vertical setting in to compress these spans.

In the above picture, the wing has been

required at this center has removed from the existing fig. Schwegmann each wing half is covered by means of an installation over which hydraulic lines and other components are fitted prior to wing tack and are joined to the fuselage.

The further modifications work (below) the wing panels are tilted to a horizontal attitude and lowered onto wing back for easy accessibility.



it's

AETCO

for complete
testing of
aircraft components

To speed the flow between strategy and production, it is desirable to have one responsible line to achieve coordination, to ensure coherence, to guide the taking of systems of direct employee services. This is not the New Unionism but

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THE GROWTH OF THE POPULATION,

THE LABOR FORCE AND

EMPLOYMENT IN SCIENCE

AND TECHNOLOGY, 1870-1950

POPULATION

For every person in the population

there were 2.3 persons

and 3.8 persons

LABOR FORCE

For every person in the labor force

there were 2.9 persons

and 4.7 persons

EMPLOYMENT IN SCIENCE AND TECHNOLOGY

For every person employed in science

and technology

there were 16 persons

and 85 persons in 1950

SOURCE: U. S. DEPARTMENT OF COMMERCE, BUREAU OF THE CENSUS. FIGURES ADJUSTED BY THE BUREAU OF LABOR STATISTICS, THE NATIONAL MANPOWER COUNCIL, AND THE NATIONAL INSTITUTE FOUNDATION.

Attack on Engineering Shortage Gains

By Henry Leiter

Everybody has been talking about the engineering manpower shortage, and now finally somebody is starting to do something about it.

The "somebody" is a composite of education, industry, government, public-spirited citizens and engineering professional societies who are coming up with a number of promising approaches involving better utilization of our engineering manpower and ways of increasing the supply of new talent.

Regardless of these steps, however, the situation not only will remain serious but is likely to get worse. It can be likened to a man trying to fit a 32-in. belt around a 46-in. waist no matter how he tries he can't stretch it enough to go around.

The most obvious of help wanted "shortcomings" (that's the word) is a recent *Seattle* edition of the *New York Times* carried more than 135 columns (14 pages) of ads offering jobs to engineers. A typical recent issue of *Aviation Week* contained 75 pages of such ads.

When the American Institute of Physics opened a job placement bureau at the United States Visitor during its recent meeting in New York in January, the bureau was managed both by students "talent search" and by those who entered in using what was being offered.

Industry recruiting teams are visiting all over the nation's campuses, leaving each office to be first in line to offer the year's crop of graduating engineers 5400 a month starting pay. One company is reported to be offering new university \$1,000 for each student that accepts its employment offer.

An entire defense manufacturer estimated a cost but not of about

charges can be made to stick, but they tell only part of the story. Like the vacuum system of computers and the mobility of our labor force contribute to the nation's engineering and efficient use of manpower. And we cannot find a man who has studied engineering to take a job in engineering.

The last, long-term answer is a greater supply of engineers, and the place to attack this phase of the problem is in the high schools.

In the meantime, interim shortage plans are being implemented among at immediate requirements of our education of the present supply.

Many of the eyes will create an comfortable side reactions. For example, the key to greater interest in technology by students is the creation of a large, more effective force of science and mathematics teachers, but these teachers will come from the same top intelligence bracket of our population that supplies our engineers and scientists.

We can relieve our exposure of part of their burden by giving them more help in the form of technicians and engineering aids, but this may divert more promising young people from their engineering careers to a less technical career.

Resolving industry interest will put the schools and government at a disadvantage. If the school or government receive their salaries, then industry will have more trouble filling its needs.

The United States produced about

Momentum

23,800 new engineers last year, an increase from the 20,000 graduates in 1944. But hardly enough to match the technological growth which requires an ever increasing proportion of engineers and scientists in our work force.

Technology's Growth

Here is an indication of how technology has grown in this country:

• **Population**—For every person in the population in 1910, there was 1.64 in 1950.

• **Labor**—For every person in the labor force in 1910, there was 1.63 in 1950.

• **Science and technology**—For every person employed in science and technology in 1910, there was 1.54 in 1950.

The number of technical people grows at a rate more than three times as fast as the general population or labor force from 1910 to 1950.

More recent figures for the period 1950-1955, show that the population rose by 15%, the number of engineers by 282% and the number of scientists by 515%. The trend to technology is accelerating.

Prof. J. D. Riden, dean of engineering at Michigan State University, points the problem. "Much more engineering goes into a turbine than went into a Corbin engine; there is more engineering in a TV set than in a mechanical radio set. So we are badly short of the men who can design the good new ways to come."

Dr. Clyde Brannett, director of engineering research and development at

Manpower Utilization Program

From interviews with top officials industry, engineering executives, government officials, education and engineering school representatives, Aviation Week has constructed a 20-point program, outlining the most effective things that are being done and can be done to alleviate the nation's technical manpower shortage. The points with some amplification are:

- Remove our of technicians and engineering assistants.
- Provide tools such as slide rules, computers, wind tunnels, model shops, laboratories, etc.
- Stimulate techniques, making it possible for sub-professionals to take over some of the engineer's work.
- Find leadership and oversight of engineers.
- Reduce duplication of engineering effort within and between organizations.
- Investigate organization of engineering, comparing advantages of project and systems engineering approaches.
- Investigate the timing of alien engineers.
- Find ways of subcontracting out routine engineering load.
- Employ students and high school teachers on a part time basis.
- Take legal advantage of selective service regulations.
- Recognize the known work that has upon engineers' minds.
- Reuse the engineering talent.
- Provide the opportunity for advanced study and professional development.
- Provide partial paths of development, so the engineer need not become a manager or supervisor to get ahead.
- Institute company programs for training technicians.
- Set up computer educational programs with the schools.
- Lead industry engineers to the schools on a part-time basis.
- Set up salaries and fellowships for teachers, to give them greater awareness of student's needs and problems.
- Provide higher salaries for beginning instructors.
- Increase utilization of mathematics and science teachers.
- Permit universities to break extra hours for extra pay.
- Improve teaching procedures.
- Set up system of awards and honors for students and teachers to encourage and reward the study of science.
- Employ retired engineers as teachers or industry consultants.
- Increase practical activities to interest young people in engineering.
- Expand scholarship programs to help gifted students finance their engineering education.

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A key position is now open in high temperature test work at our large, West coast engineering and manufacturing company.

THE WORK

You will set up high temperature test programs to include: (1) Mechanical and physical properties; (2) Stress-strain or load-deformation information; and (3) Creep and fatigue data. You will also analyze, evaluate and compile experimental data, write technical reports, consult with design and structures engineers.

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We believe this is an outstanding opportunity. After we discuss the merits of salary, and you have made about our free working conditions and "fringe" benefits, we feel you will agree. For further information, write:

Personnel Dept.,
1000 West 10th Street, San Francisco 18, Calif.

General Mills, had this to say before a congressional committee about the impact of automation. If we had to turn out the nation's 1975 workload in 1948 tools, we would need a labor force of 145 million instead of today's approximately 65 million. Technology, defined as automated manufacturing, has enabled the U.S. to consistently increase its Gross National Product with out fantastic increases in man working hours or lengthening of the work week. The role of technology will increase in the future, assuming the demand for engineers and scientists.

Technicians and Aids

A grand gap of various engineers is that this line is expanding much more on the basis of an widening and long, involved computations that properly trained sub-professional aids or technicians could handle. Management generally recognizes that it is more economic to utilize highly-trained engineers and scientists with work that is within the capabilities of lower-grade engineers, and usually has definite policies with regard to giving the engineer much to do.

When it comes to implementing these policies, however, that old saw "shortage" crops up again. Shortages of talented men and few technicians to turn on engineers are considered about the trouble is that this course is gradually forcing technicians into engineers. Compared with the upcoming crop of 23,000 engineers, the technical field school is still producing about 14,000 technicians, the income ratio of which is desirable. The National Council of Technical Schools estimates that U.S. industry can look ahead five years or more, engineering technicians are more being trained in technical (two-year) institutions.

Russia's 1,980 technicians (technical engineers) are expected to graduate 60,000 engineering technicians this year, one about enough to meet U.S. requirements. According to the study "Social Professional Mismatch," by Nicholas De Witt of Harvard's Bureau Research Center, the proportion of technicians to engineers in the Soviet Union was about 17 to 10 in 1956, the last year for which there are reliable statistics. There have been four times as few applicants for many openings in Russia's technical men. So the schools have become increasingly selective and, it is thought, may have rejected applicants to those who have completed their secondary education.

Many U.S. companies have set up their own programs to deal with the technician problem. Boeing Airplane Co. runs its own training program for draftsmen and believes that filling its technician ranks will be no problem in the foreseeable future. General Mills

conspicuous with local schools in Minneapolis in technician training programs. Bell Aircraft Corp.'s Niagara Frontier Division employs an advanced after-school class in blueprint reading, pattern layout, template construction and other trades. The teachers are company engineers who have been rotated in as students in the Adult Education Dept. of the New York State Board of Education. These examples are typical. Under the umbrella of the use of able technicians if industry practices greater standardization more engineers would make it possible for a professional engineer to turn over more work to his engineering assistants.

Computers Can Help

A well equipped and well-staffed computer service can save the engineer's time, solving problems for him quickly and freeing him to do more constructive drafting. Many companies, such as Sperry, General Electric, and General Motors, offer computer services for their major engineering groups. As engineers and draftsmen become familiar with computer capabilities, they find more applications for them. Many companies report they have a sizable quantity of additional computer on order to help deal with the soon building backlog of computer problems.

This has led to a warning against "computeritis"—"maybe we're trying to solve too many problems," according to Frank Link, vice president and chief engineer, Ryan Aeronautical Co. This view is also suggested by Robert L. Berman, assistant chief engineer, design division, Republic Aircraft Corp. The company has a sizable complement of computing machines, which it uses on order. This does not necessarily result in a manpower saving, Berman says, because "instead of doing 15 studies on a project, our engineers may now visit

perhaps 40." However, the greater number of studies probably will mean a better final product.

Other tools for the engineer, such as speed, tapers, laminates and standard shapes, permit the engineer and designer to find his ideas more quickly and thus equal the displacement cycle.

Here was a great deal of drafting time, a single photographical technique. Patterns are made of wire and tubing, models and these then serve as engineering drawings, eliminating a good deal of drudgery in the drawing board.

One Republic measure which has got off to a headstart is the Engineering Competence and Specification. Section, a goal to take over the engineers' letter-writing and computer checks, becoming superior in handling through the standardized group and a specialist assigned to answer each one. He contacts the selected engineer in person or over the phone for further information and then acts as the letter. Some men are disappointed at having their personal stampbook but Republic says most of its engineers have welcomed the plan.

A good example of what can be done about engineering education of engineers in this set of figures from Boeing Airplane Co. In the period from 1938 to 1955, the company was able to reduce the proportion of engineers required in preliminary design from 90% to 45% of the required staff in the place of operation, the engineers required in production engineering dropped from 55% to 40% during this period. In the interim phase the percentage of non-engineers went from 11% to 35%.

(Next week's article studies engineer's gaps about management and examines in detail's efforts to remove the work of design and engineering activities of human resources.) It also discusses what can be done to increase industry's supply of its present and tomorrow.



More Technical Talent From New York

One response to the nation's talent plan for more trained technicians has come from New York City where construction has begun on a \$5.5 million Aviation Trades High School. The school, which will house 37,000 sq ft and a 15,000-sq ft lounge, will be capable of handling 2,500 regular students and house 4,000 to 5,000 night-time students.

Now!... the NEW ROBINSON WIRE TWISTER with DIAGONAL GRIP-HEAD

Fast!... extra efficient than ever! The new, standard **DIAGONAL GRIP-HEAD** is designed especially for three types: high-tensile three strand wire, high-tensile four strand wire, and high-tensile three strand wire. It is now required for use in any other standard wire as much as \$140 per engine assembled.

3-TOOLS-IN-1... place-cuts-inches 500, 600, 650, 700, 750, 800, 850, 900, 950, 1000, 1050, 1100, 1150, 1200, 1250, 1300, 1350, 1400, 1450, 1500, 1550, 1600, 1650, 1700, 1750, 1800, 1850, 1900, 1950, 2000, 2050, 2100, 2150, 2200, 2250, 2300, 2350, 2400, 2450, 2500, 2550, 2600, 2650, 2700, 2750, 2800, 2850, 2900, 2950, 3000, 3050, 3100, 3150, 3200, 3250, 3300, 3350, 3400, 3450, 3500, 3550, 3600, 3650, 3700, 3750, 3800, 3850, 3900, 3950, 4000, 4050, 4100, 4150, 4200, 4250, 4300, 4350, 4400, 4450, 4500, 4550, 4600, 4650, 4700, 4750, 4800, 4850, 4900, 4950, 5000, 5050, 5100, 5150, 5200, 5250, 5300, 5350, 5400, 5450, 5500, 5550, 5600, 5650, 5700, 5750, 5800, 5850, 5900, 5950, 6000, 6050, 6100, 6150, 6200, 6250, 6300, 6350, 6400, 6450, 6500, 6550, 6600, 6650, 6700, 6750, 6800, 6850, 6900, 6950, 7000, 7050, 7100, 7150, 7200, 7250, 7300, 7350, 7400, 7450, 7500, 7550, 7600, 7650, 7700, 7750, 7800, 7850, 7900, 7950, 8000, 8050, 8100, 8150, 8200, 8250, 8300, 8350, 8400, 8450, 8500, 8550, 8600, 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More and more, equipment on today's aircraft requires constant frequency electric power for optimum performance. To provide more reliable a.c. power, General Electric has developed a new 20 KVA hydraulic constant speed drive with a weight of only 35 pounds. This 6000 rpm drive delivers a full 25 hp over an input speed range of 3900 to 7500 rpm. Steady state speed control of $\pm 1\%$ is provided by a built-in mechanical governor and speed control to $\pm 1/16\%$ can be obtained with an additional trimming device. Automatic paralleling can also be provided for two or more drives.

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ENGINE-OUT PROCEDURES on light twin vary from type to type. CAA advises pilots to learn specific methods for emergencies outlined in manuals supplied by each maker.

CAA Warns Light-Twin Pilots Of Need for Engine-Out Training

By Erwin J. Balaban

The need for a practical knowledge of emergency procedures after an engine failure has assumed new importance with the increasing numbers of light twins now plying the business aircraft fleet and flying by pilots who, as novice entrants, have made the transition to multiple-engine from single-engine aircraft.

Civil Aeronautics Administration spokesmen emphasize that the new light twin are excellent and safe models. They are concerned, however, over a number of accidents that have involved experienced pilots who apparently ran into trouble while dealing with the magnificent performance of their new planes.

Approximately 11 light-twin accidents have been recorded in the last two years—a high percentage of them attributed to incorrect procedures followed after the lost (dehatched or otherwise) of an engine.

Indiscretion Need

Manufacturers have been aware of the need for indoctrinating their new customers prior to handing over the airplane and have adopted procedures to check them out rather than their disorientation on the plane.

One prominent manufacturer of light twins said recently, "We give help with a distributor or he sends a customer on to us to pick up an ac-

plane, who shows unfamiliarity with the type."

Although it's difficult to fly down hard and fast when dealing with a customer, the manufacturer said, the factors will assure that it is a company personnel have a minimum of 50 hours multi-engine flight time before they are qualified to fly such types.

This includes engine-out or takeoff second engine engine failure, cutting off the fuel on one engine unexpectedly while in flight and bringing one engine down to zero thrust and allowing the propeller to windmill.

The Civil Aeronautics Administration usually a such release recommendation procedures to be followed in such emergencies.

The agency emphasizes that multi-engine pilots must have familiarity with these critical aircraft speeds.

Engine-out emergency control speed the speed below which the aircraft cannot be controlled in flight with one engine operating at full power.

Engine-out best climb speed: The speed which provides the best rate of climb or climb descent with one propeller out. This can be very close to the engine-out minimum control speed.

Control Speed

Engine-out maximum control speed is given as the manufacturer's aircraft flight manual and can be confirmed by practice. The published speed has been

established for the most critical condition—the airplane fully loaded and with full takeoff power on the operating engine. In view of the fact that engine power decreases at lower altitudes, engine-out control loss is more critical on altitude, particularly from aspects at low altitudes.

In case of an engine failure at an airport, before the engine-out minimum control speed, the other propeller must be throttled quickly to a point where flight control can be maintained. If this power fails to prevent loss of altitude, the airplane should be landed immediately.

If it must be turned back to the field, it should be banked no more than five degrees in the direction of the operating engine in order to maintain maximum lift.

Climb Speed

The best engine-out climb speed also is called as the aircraft's flight manual. The strongest point, the strongest angle of climb for clearing obstacles, is usually lower and also in the manual.

Pilots are warned to use extreme care in maintaining either of these speeds for three reasons:

- They require prolonged flight at speeds very close to the engine-out minimum control speed.

- A deviation of only a few miles-per-hour from prescribed speeds results in a significant decrease in climb performance. Loss of climb will result just as much from as too high altitude as too low, the CAA report says.

The CAA will acknowledge as the future that its concern not only be thoroughly familiar with these procedures but also that they make sure that the pilot is just as familiar with the particular model of airplane with which he is taking his flight.

The latter is particularly important because the actual procedures involved in emergencies vary considerably with each make of aircraft and the pilot should not attempt to apply basic rules across the board for all aircraft. This procedure has been followed for many years by operators of large multi-engine aircraft, such as the airlines, who insist that a pilot be qualified for each particular model he flies.

The CAA therefore recommends that pilots learn from a qualified source configurations of landing gear, flaps and propeller with which his plane will maintain altitude with a full field and engine out. "Airs should cover full gross weight" says the last rule of climb for at least five minutes, it is noted. Several field accidents have resulted from attempts to pull up for

a go-around with gear down when the airplane was unable to climb at this configuration.

Failure in Flight

To establish single-engine flight after an engine failure, emergency, it is recommended practice to apply METO power to the operating engine until level flight is clearly established. If the airplane is forced capable of level flight or climb with the existing load, altitude and temperature, appropriate power reductions can be made. However, approach should not be permitted to fall below engine-out best climb speed, even though altitude is lost, since this speed should always provide the best chance of climb at the best altitude loss.

Czechs Swing Argentine Deal: Lightplanes for Wool and Wheat

Buenos Aires—Consistent Czechoslovak has presented the Latin American light aircraft market by means of a barter agreement with Argentina that provides for the exchange of some 3500,000 in Argentine wool, hides and wheat for 15 airplanes and spare parts. An initial delivery of eight planes is scheduled to be made the latter part of this month.

The exchange goes through substantial to President Argentinian, who recently announced that Argentina will continue to foster trade relations with the Soviet bloc.

A press office of the Argentine Ministry of Aeronautics told *Airways* that Wenz's correspondence here that Russia also has submitted a proposal to its

government to supply Argentina with MIG-15 fighters and bombers on an exchange similar to the Czechoslovakian agreement (AW Feb. 15 p. 31).

The lightplanes actually were to be delivered to an Argentine export-import company, set up by former President Peron. This organization is now being dissolved, and its functions are being returned to private enterprise.

The aircraft now will be delivered to State's Argentine representative, Dr. Maria Funes, for distribution.

Aero 45

Included are the Skoda Super Aero 45 all-metal, low plane, four-engine aircraft powered by 165 hp Walter Munc 4-cylinders with fuel-injection propellers. They



SUPER AERO 45s will arrive in Argentine this month, along with Czech aircraft personnel.



LO-46 Hercules has unusual "convertible" landing gear with tricycle under nose.

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is an improved version of the Aero 45 now displayed at Canada's eighth biennial International Trade Fair at Toronto last year. The new model has improved wing loading for warm climates, the leading edge wing ribs have been eliminated, and an improved propeller and instrument layout are provided.

The price has been set at \$25,000 c.i.f., with sufficient spares for 1,000 flight hours. In addition, the contract provides that three Czech factory representatives will be sent to Argentina for a three-year period to help secure the aircraft.

U.S. business aircraft observers who use the Cuban version at Toronto last year said the aircraft felt far different in equipment and performance in comparison with corresponding American airplanes. They were particularly impressed by the Aero 45's single-engine performance.

Nevertheless, it is reported that additional negotiations are under way, whereby a total of 60 of the Czech biplane would be sent to Argentina.

Additional negotiations are taking place on several other Czech aircraft.

• **Stuka L-60**, an agricultural plane (also high-wing monoplane design, four-seat) operated by De Alcañal construction, is said to weigh 1,537 lb empty and 3,014 lb loaded. Price is \$17,800. An order for eight L-60s is being discussed.

• **LD-40** three-place low-wing all metal monoplane powered by a 107-hp Walter Minor 4-111. Cruise speed is about 114 knots. Planned further in placement of the trike used in flight at the end of the cycle, providing in effect a two-place landing gear in future. Price is given as \$8,800.

• **X-126 II** is a two-place low-wing monoplane powered by a 104-hp Walter Minor and carrying about 1,190 lb. It sells for \$18,000.

PRIVATE LINES

Lowest rebidder, Birmingham Corp., made 240 flights in a two-year period carrying 73 hours and 40 minutes. Vought Inc.'s composite transport flew 900 hours in eight months with trip lengths averaging about four hours. Lear, Inc.'s Aircraft Engineering Services Division, Learcraft builder, estimates that the planes will exceed 188,000 hours utilization collectively by the end of the year.

Among the propeller studies undertaken by McCulloch Industrial Corp., Dan, Ohio, is the use of suspension and a new lubricating gear for private planes. It is estimated that single-row propellers would weigh about as much less than contemporary all-

aluminum types. The first has delayed over 1,000 of its contact-point Mat-Lite propellers and then was installed on about 75% of the Cessna 180s being delivered. Companies say that prop is now running 1,500 hr without any maintenance problems.

Instrument flight "short-hand" booklet, containing even lower instrumentation and ground used as IFR is being distributed gratis by New School of Aviation, Mississippi Airport, Box 7074, N. Fair, Okla. Material was compiled by Civil Aeronautics Administration's Policies and Procedures Staff, Aviation Safety, Standardization Division, Oklahoma City.

City of Winona (Minn.) is building a new shop area for Van's Air Service, Inc., large enough to accommodate two DC-3s. The business aircraft service operator plans to shift the major part of its facility from St. Cloud to its new base. Firm is a distributor for the Auto Commander and is coming and Commercial engines.

Three prototypes of four-place twin-engine plane will be built by Blue Aviation Associates, San Diego, Calif. Powered by a 175-hp Lycoming engine, design speed will be 160 mph, range will be about 700 mi. Price of production models is expected to be about \$9,300.

The National Business Aircraft Association has asked out the first study of a new insurance plan for its pilot membership to provide compensation against possible loss of air transport services in the event of disability. The plan will provide payments to begin approximately 30 days after such an accident, applying income while the pilot either regains his certificate or finds another position.

Beck aircraft inspection class, regional study by the manufacturer and its distributors will be held from March 28th to mid-September. Factory teams will visit more than 30 locations throughout the U.S. to check more than 100 points on each airplane. Class will report to owners of all Beck models up to last year it was devoted exclusively to the Bonanza. Since the class started in 1949 over 5,000 Beck planes have been inspected free of charge.

Three Paper Airplanes have been donated to the Canadian Department of Transport, adding its growing number of light plane now being sold by government departments. Other Airplane, under the Canadian Civil Aviation Administration, New Zealand.

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Department of Transport Belgium Congo and Nigeria Government. One is also used in the Chief of the Cuban Air Force. Herald Fleet Service has received four 150 hp Pave Super Cals to be used in fire spotting and control and low enforcement.

All wire retrofits for Balsa Corporation of Australia's line of commercial and private electronic equipment have been transferred to 14519 Olympic Blvd., Los Angeles, from Canada, N. J.

Time-Pacific crossing was made by two Balsa Super 10s from San Francisco to Tokyo with stops at Honolulu and Wake Island. Longest leg: 2,400 mi from the mainland to Hawaii was flown in 17 hours using extra tanks which increased fuel capacity from 250 gal to 632. Planes were delivered to the Japanese Coast Guard.

Marsh Aviation Co., Phoenix, Ariz., which handled approximately \$400,000 in aerial application business last year, has been sold to American Remount Corporation, a holding company. Leslie A. Wood, vice president at Valley National Bank of Phoenix, is now president of the aviation firm, replacing William O. Marsh.

All-women's international air race, to be held May 13-23, will offer \$2,000 in cash prizes for six first places, in addition to trophies, all to be donated by the Cuban government and airline Sosa. National Aerobics Association event will originate in Elmhurst, Ont. and terminate in Havana. Entries deadline in May 1. Write: Irma Price, First Chair, 242 S. W. 8th St., Miami, Fla.

First Fiberglass Tuxedo for New Zealand has been completed. Firm says that it has taken for 20 of these airplanes pending delivery of the first one.

Scientific appointment Pacific Airline Co. Corp., Oakland, Calif., will handle sales and service for the Rockwell Moon two over through its branch at Stapleton Airfield, Denver, Colo.

Two Sikorsky S-55 helicopters have been added to fleet of Gulfstream Co., New Orleans, La., for use in offshore oil operations. They will be delivered in February and April. An S-55 was delivered early in February to Gulfstream Aircraft Engineering Corp., N. Y. It will be fitted with a new, drag-resistant type flotation gear on the aircraft's four wheels. Entire flotation system, including legs, structure lines and compressed air cylinder weighs 120 lb. The S-55 is for standby duty over water for ac-

cident emergencies when Gulfstream pilots are making test flights.

Private plane flights to Cuba from U. S. increased to 641 airplanes in 1955 compared with 493 the previous year. The airplanes last year carried 2,000 people to Cuba compared with 3,164 in 1954. Elimination of air tie, providing a simple general deceleration form and use of a special flight authorization plan, are cited with increase in personal plane traffic between the countries.

Tom Air Group, Inc., plans to reorganize one-hour flights between Detroit and Cleveland for businessmen this spring. First flights daily will be made each way by a de Havilland Canada Otter biplane, wing of at least two hours compared to surface transportation. Operation first is expected to be 514 plus two Saturdays will be sustained from April through and November. IAG plans similar service to Toledo later if a demand develops.

New business pilots organization, Society of Industrial Pilots, Inc., has been formed in the New York area. President of the new group is W. D. (Dick) Goshen, longtime president of Remick Field, N. Y. In addition to fostering interchange of ideas among non-union, the group offers a "line of honor" membership plan. Temporary office set at 222 Seventh St., Garden City, N. Y.

First six civil helicopters sold in 1956 by Bell Aircraft Corp.'s Texaco Division, Ft. Worth, all went to different countries. A 470-2 with night flying instruments, dual controls and radio to the American Army for rescue, a 200 hp 470 with spray/dust kits to Helicopter Services of Auckland, N. Z., a 470 demonstrator to Bell's West German distributor, Hubschrauber-Vertrieb, Düsseldorf, a three-place chopper 470 with hydraulic boost controls to Pacific Western Airlines, Vancouver, B. C., a general charter type to Helco, C. A. Caracas, Venezuela and one to General Air Transport, New Orleans.

Tiretek landing gear kit for Cessna 180 has been made available by Mac-Gee-Air, Fullerton, Calif., which earlier developed a similar installation for the Cessna 170. Installed price at local dealers for the 180 gear \$1,045 for the 170, \$950. Gear weight for the former is 54 lb., for the latter 33 lb. Model 180 kit is installed by moving installed spring load strut back 30 in. and installing it at a new bar action. Nose wheel carrying a 5 1/2 x 5 tire, mounts fore and aft at the junction with the fuselage.



New... Titeflex high-temperature HOSE CLAMP

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This new enhanced Titeflex Hose Clamp is made from unhardened stainless steel. It is heat treated and stress relieved to meet the demands of high-temperature applications.

enhancing quality and grip despite narrower hose, pressure, and the stress of acids, herbicides and synthetic fluids.

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To Stardom



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In RMI's new, completely equipped chemistry laboratories, important research projects are continuously contributing to the advancement of rocket technology through the development of new high-energy liquid and solid propellants and through the investigation of other areas of rocket technology dependent upon chemistry for their improvement. Thus, in designing and producing new rocket engines for many important applications, RMI is providing vital assistance to its own engineers and the rocket industry through chemical research.

Spearheading Progress through Research



REACTION MOTORS, INC.

Denville, New Jersey

A MEMBER OF THE TEAM

Cessna Leads in Plane Shipments

Cessna Aircraft Co. took its work load this year over all other U. S. business and utility airplane manufacturers, delivering 248 units in January with a total value of over \$1.7 million. Piper Aircraft was second with 194 airplanes valued at \$8,315,474. Beech was third, delivering a total of 51 aircraft worth \$1,607,800.

Cessna's January 1956 shipments easily doubled the company's shipments of 124 planes in January 1955, dollar volume however was well over double, the \$1,745,000 figure of the year, good last year on American Winter survey data.

Furthermore, noticeable in January's

shipments was the large number of Cessna 172's delivered. The twelve month of the Model 172 exceeded deliveries of its nearest competitor, the Piper 16-Place, for the second consecutive month. Model 172 shipments started last November when 76 airplanes were delivered, December deliveries totaled 97 and January's were 152.

A further study of deliveries by the "Big Three," also together with a half-century for the industry, show that their combined deliveries in January also exceeded January 1955's in both number of units and dollar volume. 495 airplanes valued at \$8,900,179 as against 323 valued at \$4,173,000.

BUSINESS AND UTILITY PLANE SHIPMENTS

January 1956

| | Complete Aircraft | Publisher's Net Billing Price |
|-------------------------------|-------------------|-------------------------------|
| Aero Design 500A | 9 | \$670,500 |
| Beech | | |
| Bonanza | 23 | |
| Super 18 | 6 | |
| Twin Bonanza | 8 | 1,801,800 |
| Model 40 issues | 0 | |
| Cessna | | |
| A-1A | 0 | |
| A-4 | 0 | 0 |
| 510B | 0 | |
| Cessna 440 Twin-Piston | 4 | 144,000 |
| Cessna | | |
| 170 | 50 | |
| 175 | 116 | 3,735,600 |
| 180 | 75 | |
| 310 | 81 | |
| Champion | | |
| Champion | 10 | 99,500 |
| Hells | | |
| H-3618 Coastal | 3 | 69,000 |
| Loar | | |
| Loar Mk. 1 | 1 | 400,000 |
| Messner | | |
| Model 80 | 3 | \$0,137 |
| Piper | | |
| Super Cub | 57 | |
| T-4-Pacer | 100 | 1,815,474 |
| Apache | 35 | |
| Reynold | | |
| Reynold P-156L1 | 2 | 149,000 |
| Taylorcraft | | |
| Taylorcraft A-15A | 0 | |
| Model 80 | 3 | \$1,568 |
| Totals | 570 | \$8,900,179 |

Compiled by AVIATION WEEK from manufacturers' reports.



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Dr. Edgar G. Schneider, Chief Engineer of the EPRC System Division, discusses with two guests (top left) and members of the EPRC System Division. From left, Paul B. Brock, Manager of Avionics Laboratory, Dr. Marvin D. Brill, Manager of Medical Systems Laboratory, Dr. Leonard S. Shengul, Manager of Avionics Research Dept., and (standing) Dr. Oliver G. Heyward, Manager of Avionics Laboratory.



Carl Cullen, electronics engineer, views a tracking window tube at the Walling Laboratory.



The new Walling Laboratory, given over to research projects related to radar, air traffic control, and aviation electronics. Computerized data processing, the building contains 100,000 sq ft of floor space.

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GIVEN: Problems whose terms entered into electronic, where "electronics" are solved by electronic systems to assure the orderly security and industrial progress of the nation.

APPLY: The Systems Approach, modern research, development, and productive capabilities of the Sylvania Electronic Systems Division . . . with

installations at Walling Mass. Mountain View, Calif., and Buffalo N. Y., staffed with top-ranking scientists and engineers, and backed by Sylvania's extensive resources in the electronics field.

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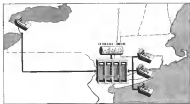
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AVIONICS



NEW AMERICAN AIRLINES plan will enable Buffalo passengers by computer at top left to instantly interrogate New York reservation computer (below right) and to then tell space seat or rapidly and efficiently as it were another New York City ticket office.

New Airline 'Datamation' Theory To Undergo Evaluation at Buffalo

By Philip J. Kline

The formation of a nation-wide air-line electronic data processing system designed to speed reservations handling and to provide the customer the chance for human care will go into trial operation next month at the American Airlines reservation center in Buffalo.

Buffalo will be the proving ground for the new technique, both of considerable interest to persons concerned with airline reservations. They are: • Remote site operation of a central reservation computer (Reservcon). The Buffalo center will be able to instantly interrogate American's central Reservcon at New York, 100 miles away, for space and tell each space just as if it were another New York City ticket office.

• Use of punch cards to record and process all reservation requests and to record information with the flexible advantages of using machines to sort, select and collate data. Each request, when the flight involves connections or stopovers at non-stations along the route, the punch cards will automatically transmit the request for space and all associated reservations data to each station involved. The information will be transmitted via American Airlines teletype circuit.

Giving Menus

Electronic techniques for synchronized handling of airline reservations inventory, pioneered by American and The Teletype Corp., which built the original Reservcon for the airline, are

putting menaces in their acceptance in the transport industry. For instance: • American Airlines will soon replace its original Reservcon with a new model that has roughly 12 times as much capacity. The new Reservcon will be able to handle 2,000 flight legs, compared to the present 1,000. For 31 days, versus 10 at present, with up to 155 seats per flight compared to 127 seats per flight in the original version. • Reservcon has added a Reservcon, for installations at Buffalo, which can be interrogated by teletype via

charts or Agent Subs anywhere along its route.

• American Airlines is installing "Availability Panels" at its Chicago, Washington and Boston reservation centers (for explanation of the difference between a Reservcon reservation computer and an Availability Panel, see box below).

• United Air Lines has installed Availability Panels at New York, Chicago, Los Angeles and San Francisco. This is the first step in what eventually will be a nationwide system with a central reservation computer to be installed at Denver.

• Northwest Airlines and National Air Lines have ordered Availability Panels from Teletype for installation at their New York City reservation centers.

• Northwest Airlines is considering the installation of a new system developed by Sperry Rand Corp. This would not only provide a central reservation computer but also would keep a record of the number of space requests on wait list and the number of seats sold by each station.

Only The Beginning

Just growing within acceptance of electronic inventory control is only one reminder to sell-space—and it is one of the most possible commodities in the world. The very speed at which airlines operate demands swift handling of reservations. If an airline exceeds, it has serious customer relations problems. If it is slow, the last reserve comes out of profits.

The next move will be to extend over the reservations systems of several

Electronic Inventory Control Terminology

RESERVATIONS COMPUTER: A device with the capacity for storing large amounts of data which keeps a running, up-to-the-minute inventory of space available on each of a number of dates flights. The Teletype Corporation's Reservcon, the new reservation computer now in use, can also be used to store up-to-the-minute information on flight arrival and departure times.

AGENT SUB (HANDSET): A small device, consisting of a sliding switchboard which enables a ticket agent or reservation clerk to instantly interrogate the reservation computer to determine if a given number of seats are available on a particular flight. If the seats are available, and so will, the use is automatically transmitted by the Agent Sub to the computer which automatically affects its inventory figures accordingly. Classified space can be reserved by the computer when the information via Agent Sub can also be used to obtain information on flight arrivals and departures, set into the computer by the airline's flight operations department.

AVAILABILITY PANEL: A punched-tape device which can be interrogated for space availability in an Agent Sub and which will automatically indicate on the Agent Sub one of three possible conditions existing for a particular flight.

• Open for sale.

• Sold down to the "bottom" (This means that space cannot be sold without the agent contacting the controlling reservation center via teletype.)

• Sold out.

The Availability Panel is kept up-to-date by human operation, who in turn obtain this information by means of teletype to reservation centers. An Agent Sub connected to a remote reservation computer. The Availability Panel type system is somewhat less expensive than the Reservcon Computer.

The New MS-8-1 by Stroukoff



Combines For the First Time Pantobase

(All Bases)

and
BLC

(Boundary Layer Control)

It is with pride that Stroukoff Aircraft is producing for the United States Air Force the most advanced advanced aircraft in the history of military aviation.

This development combines state-of-the-art technology with the latest in Boundary Layer Control systems, and includes the Pantobase installation, both designed by Stroukoff Aircraft Corporation.

The MS-8-1 is able to land and take-off from unpaved surfaces with no wind, no rain, no snow, no ice, with only one person to operate from within it. It will do so at low speeds even before take-off with only one person to operate from within it.

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NEW JERSEY



AGENT SET: two airplane either Agent Set or Reserve computer

allows, enabling each to control water (the other's operations computer or Availability Panel) for monitoring space.

Although electronic inventory control systems will do much to speed reservations handling to enable the airlines to cope with anticipated traffic growth, there will still remain a large and costly area of manual operation. For example:

- Name of each passenger, his contact point, stop-over station and special instructions (such as "first-class" or "wheel chair") will need to be recorded manually.
- Multiple handling of such data and transmission into other records, is a slow, costly process and introduces the possibility of human error.
- Obtaining necessary financial and operational data from such manual records is a time-consuming and costly process.

However, electronic data processing equipment which will be available in the near future will perform many of these costly tasks automatically and will also provide services and information which is not now available to airline management and operations people. Charles G. Abbott, chief of the Transportation Administration's Reserve System Committee, during its recent meeting in New Orleans. Abbott is manager of Advanced Process Application for American Airlines.

In addition to its inherent advantage that "once information is correctly introduced into the system it cannot go wrong," Abbott said that electronic data processing could provide the airlines with the following:

- All names, continuing space and other identifying information would be stored automatically and be available to all users in split second.
- Alphabetic filing of all passenger records which has up to now been a dream of reservations people but impractical with present manual methods, will become a reality.
- Messages to outlying stations will be



AVAILABILITY PANEL: with operator, 1, and display, 2, man manually inserted plug jacks to indicate on Agent Set whether space is available, denied to "outside" or held out

created automatically from the original customer record, in a form suitable for the receiving station, and transmitted to it automatically without human intervention.

- Passenger fare will be computed automatically and filed with the record.
- Automatic manifest preparation for departing flight, including load computations.
- Automatic ticket preparation by electronic data processing machines.

In the field of revenue accounting, and possibly in flight scheduling, the same data processing machines also offer a big payoff, Abbott believes. Unlimited reports, records, statistics and financial documents can be prepared with great speed.

The time is at hand to start re-organizing people that we use will be



absorbed, viewed as a result of introducing (three) new and improved techniques. Abbott said "Electronic interchangeability, he added, will have its effect upon the size of the labor force 'but need not result in wholesale displacement of employees'."

Implications will come gradually and are not obvious in work force can be absorbed by attrition, particularly in view of the growth of the industry, Abbott believes. Also, the electronic machines will enable new jobs at machines in the planning, program writing and operation of the machines.

When the new advanced data processing systems come into being, possibly in five to eight years according to Abbott, they will take over the inventory function now performed by Reservations and Availability Panels. He

AEROTHERM AIRCRAFT SEATS



Reduce

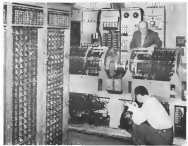
Maintenance with Interchangeable Parts

Uniformity of parts simplifies inventory and cuts maintenance costs.

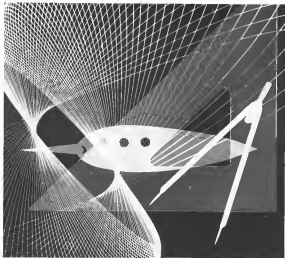
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AMERICAN AIR LINES RESERVATION System, automatic reservations computer which keeps running continuously, will be replaced with unit which has 12 times greater capacity



The Right Side of Reason: As Right control systems are considered as one of today's necessities for the planes that will fly, there are still those who say that

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The many tests there were problems in the design of aircraft which could not be solved practically except by trial and error—a slow, costly, often dangerous method.

Todays' man of this paperwork and time, as well as some of the human, has been eliminated—displaced by newly designed electronic devices. Now specially designed computer systems simulate on the ground actual conditions of expensive flights. Help perfect the performance of aircraft which are still on the drawing board.

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does not believe, however, that this is any reason for anyone to hold off buying the latter, since they will have more than paid for themselves in the time they are spared.

He backs up his statement by citing American figures that the original Resonance not only has paid for itself in five years but now nets the owner about 10% of its original investment annually.

As the airlines expand their individual electronic navigation systems and thus interconnect them, there will be more compatibility problems, particularly if the systems are purchased from different manufacturers. However, Abbott does not believe this is sufficient reason to force airline engineers' standardization on machine design. Because inventors' available industry work is already simple codes, it is computer tech can do design an "electronic interpreter" that will enable one airline's computer to "converse" with another airline's machine.

Compatibility, however, will be a more pressing problem in the ultimate future because it deals with much more complex information than voice navigation. For this reason it will be desirable to standardize on the characteristics of the basic equipment, on "its own language" and its logical equipment.

For instance, a particular code letter, like "R" might mean "look passage for" in the computer where "B" is the first character in the message, but the same letter might represent the initial of the passenger's surname in the body of the message.

Agenticizing Reapportion

Preparation for the day of fully automatic data processing will require "a thorough review of the principles and practices which underlie a close message construction and could imply that other technological changes must be made in the standard rules which govern," Abbott told the ATA Reapportion Conference. "These seemingly general re-examinations of basic principles are typical of what is required in preparation . . . for electronic data processing," Abbott added.

In preparation for its experiment at Buffalo, American has undertaken an extensive collection of its own research procedures and message coding. Later citing, American found there is a striking similarity between good manual procedures and those which can be readily followed by electronic data processing machines. AAV's W. G. Gaudier told the ATA meeting.

American selected the Buffalo—which boards around 1,000 passengers a day, many of them for connecting flights out of New York—as a proving ground be-

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double. The unit operates in conjunction with the firm's Model 433 radar box, a high-Q resonant cavity which is coupled to the radar transmission line and provides an artificial target.

During the transmitting cycle, the pulse is stored in the radar box, after which the energy is returned to the radar mock as it would be from a target. The time interval between the beginning of the transmitted pulse and the point where the signal to the radar PFI scope just disappears, called "ring time," is a measure of the jet's performance. Any decrease in transmitted power or loss of receiver sensitivity will result in a shortening of the "ring time." Small changes in "ring time" can be resolved by the tester without requiring precise heat loss measuring equipment, Nardo says.

The present weather radar preflight tester is designed for use with C-band sets, but it can be adapted for use with X-band sets the company says.

09330 FILTER CENTER 00293

► **Preferred Tubes For Missiles**—The Defense Department has released a list of preferred receiving types tubes which should be used whenever possible in guided missile avionic equipment. Objective is to limit the number of tube types in use. The list, which will appear in the forthcoming MIL Standard 200C, "Military Standard for Electronic Tubes," includes the following: 6AG7, 6AG6, 6718 (6221), 6707WA, 6719 (6221), 6704WA, 6551, 6013, 6112, 1940 (6023), 6703WA, 6809 (6023), 6536, 6704WA, 6536, 5902, 6641, 6644, 6781WA, 6641, 6803WA, 6064, 6203, 6812WA, 6812WA, 5727/2D12W.

► **Transistor Sales Up**—The transistor industry sold nearly three times as many transistors in 1955 as in the previous year, according to figures released by the Radio-Electronics-Television Manufacturers Association. Factory sales for 1955 totaled 3.6 million units, valued at \$12.1 million, compared to only 1.3 million units valued at \$5.1 million in 1954.

► **"Scatter Communications"** Grows—Despite the fact that "scatter communications" is a relatively new technique, it is fast becoming a significant factor in communications business. For example, the Air Force has spent approximately \$28 million in scatter communications facilities for use in the Arctic regions, and will invest further to expand the present Arctic Early Warning radar line. Approximately \$16 mil-

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HOW A TINY NEW TUBE HELPS SAVE LIVES

The problem was major—it concerned human life. A pocket-sized waterproof "radio station" would help rescue downed aviators. The unit was designed to send out a beacon signal and provide voice contact with search planes—but it lacked the necessary power output. Needed tubes did not exist.

Using its own resources, Raytheon developed a new subminiature tube—the 6147 and its improved version the 6387. Result: greater power, reliable operation, range over 50 miles, longer battery life.

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tion of the USAF funds have gone into tropospheric scatter communications, with the balance for ionospheric scatter communications.

Portable Microwave Relay—A new microwave relay station, which weighs only 1,990 lb., including a 100-foot telescoping suspension tower, making it transportable by helicopter, has been developed by Motorola, Inc., under Rome Air Development Center sponsorship. The tower, which telescopes into a 12-foot package, can be erected by a crew of eight in less than an hour, and the station can be put into operation within two hours, the Air Force says.

NEW AVIONIC PRODUCTS

Components & Devices

• **Master pulse transformer**, Type PT-100, with 9-pin plug-in base, provides four windings, 150 turns each. Resistance of windings are 34, 4, 44,



and 5 ohms (6.6). Unit measures 1 in. dia. x 1 1/2 in. long, weighs 3.6 oz. It is designed for airborne use. Bendhart Laboratories, 295 Bank Village, Gloucester, N. H.

• **Miniature aerial circuit**, Type 44F, fits into a UHF/VHF FM receiver, as ported for high selectivity which eliminates need for multiple conversions. Filter is available with a center fre-

quency of 10 to 20 mc., bandwidth of 6 db. attenuation of 20 to 30 db., insertion loss of 6 db. maximum, and provided accurate variation of 1 db. maximum. Slope factor is quoted at



1.73 maximum and ultimate attenuation at 90 db. maximum. Frequency shift is quoted at less than 0.005% from -75C to 85C. Unit is hermetically sealed, requires no alignment, and separately meets the MIL-E-5422 shock and vibration requirements. Hyvac Electronics, Inc., Communications Filter Div., 1360 Selden Field Rd., Boston 25, Mass.

• **Precision miniature power resistors**, Type K8, are now available in new sizes and wattage ratings. Two-watt units are available with maximum resistances of 4,000, 6,700, and 9,500 ohms, in increments of 1/2 and 1 ohm, new 5, 7, and 10 watt units are available in resistances of up to 15,000, 22,000, and 55,000 ohms, respectively, in increments of 1/2 and 1 ohm. Resistors are sealed in silicone, have temperature coefficient of 0.0002%/deg. C., a dielectric strength of 1,000 v. a.c., and come with tolerance of 0.05% to 5%. Balluff R-21B glass full disk. Kile Products, Inc., Columbus, Ohio.

Microwave Devices

• **Tuning wave tube amplifier**, Model 402A and 494A, cover the bands of 4 to 8 kmc. and 7 to 12.4 kmc. respectively. Model 402A provides 30 db gain, 10 mw. output, and 15 millimicrosecond rise time. Model 494A provides 25 db gain, 5 mw. output, 15 millimicrosecond rise time. Price is



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first name in precision control

51 190 Feb factory. Application data is available. Blackett Process Co., 275 Page Mill Road, Palo Alto, Calif.

• Magnetron load solenoid, Series 810, for 5-band use, provides remote attraction of 10 to 10 db, with corresponding magnetic forces of 0.5 to 1.5 db. Units can handle 500 hp peak power and 150 with average without external cooling. While an air liquid cooling power rating can be increased substantially. Lorton Industries, Components Div., 356 No. Fourth St., Beverly Hills, Calif., and 215 So. Foothill Ave., Mt. Vernon, N. Y.

• Traveling wave tube amplifier, Type HA/5, a low power L-band unit, operates from 1 to 2 kmc without any electron or mechanical adjustments. Good control is provided for variable gain



and power output. Gain is quoted at 30 db, and output at 30 mw. Use requires a 300 Gauss field and 250 v. regulated power supply. Daggon Laboratories, Inc., 7111 Eremite Ave., Menlo Park, Calif.

Instrumentation

• Plated rate gage, available in new line with angular measurements up to 10° gm/cm² per sec, weighing no more than 2 lb and measuring 2 1/2 in. dia. x 4 1/2 in. long, maximum. Vacuum-chamber damping is thermally stable. General Measurements, Inc., Elmsford, N. Y., or 11141 Wilshire Blvd., Los Angeles, Calif.

• Sub-miniature accelerometer, Type AVS-250 for measuring low-frequency vibrations up to about 100 cps, is designed to operate with standard error voltage (500 to 1,500 cps). Response is



flat within 3% over usable range, and sensitivity is 10 mv./g. full scale per volt input. Unit occupies only 0.05 cu. in. Galien Mfg. Corp., Metuchen, N. J.



General Electric announces

A NEW DEVELOPMENT CENTER FOR ADVANCED, SUPERSONIC AIRCRAFT ENGINES

PLEASE TURN PAGE . . . ▶



SEA LEVEL AIR PRESSURE CAN BE INCREASED 10 TIMES inside new Compressor Development Lab. Scale model of Lab's structure by supply system is examined by D. Condon (right), AGT Development Dept. Manager, and B. W. Bruckner.



POWER OUTPUT OF ADVANCED TEST TURBINES is checked by three two 500 hp 15,000 rpm dynamometers (foreground). These machines allow turbines to be tested without air compressors, cutting development time and cost.

HIGHLY ADVANCED PRIVATELY-OWNED FACILITIES IN FULL OPERATION TODAY

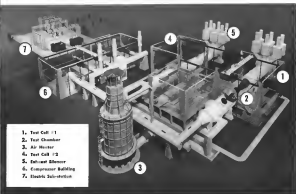
General Electric has provided aircraft propulsion facilities valued at \$100 million—with emphasis on development

Fully equipped for studies on all types of propulsion systems, including advanced supersonic jet engines, the Aircraft Gas Turbine Division's new development center at Evendale, Ohio, is a typical example of the continuing G-E investment in the future of American aviation. Already in place to help G-E speed propulsion progress are Company-owned facilities with a replacement value of \$500 million.

The center at Evendale contains the newest equipment—the most advanced of its kind—for development

of aerodynamic and mechanical engine component designs, *aircraft* ... combustion and ignition. Begun in 1950, it is now in full scale operation. Already employing over 1000 highly-skilled technicians, the center's total size will be determined only by future powerplant needs of the Armed Services and the nation's civilian companies.

Efficient, on-line development tools for continued expansion. Already scheduled is a new Supersonic Propulsion Facility, plus a new testing area for super-



1. Test Cell #1
2. Test Chamber
3. Air Heater
4. Test Cell #2
5. Exhaust Blower
6. Compressor Building
7. Electric Substation

MOST ADVANCED PRIVATELY-OWNED ENGINE TEST FACILITY IN THE NATION is to be built in 1960-62, will simulate Mach 3.3 at 80,000 feet. 340-ton engines will be evaluated at "dry" speeds as high as 2580 rpm.

sonic rocket and ramjet engines.

When these G-E facilities are completed, they will provide AGT with the most advanced, privately-owned, supersonic development tools. Propulsion research and development work done at Evendale will continue to be supported by the Company's Aircraft Gas Turbine Laboratory at Lynn, Mass., and by the G-E Research and General Engineering Laboratories at Schenectady, N. Y. General Electric Company, Cincinnati 18, Ohio.

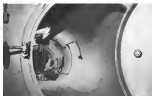
NEW SPECIAL FUELS FACILITY helps G-E design and produce conditions of new fuels for tomorrow's planes and engines.



NEW COMPUTATION BUILDING (background) contains large new electronic computers which permit rapid, low-cost approval of developments before they reach G-E drawing boards.



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25,000 RPM SPEEDS AT 4500 HP test efficiency of new jet engine components in these test tanks. Compressors are tested under both sea level and high altitude operating conditions.



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ARTIST'S CONCEPTION of Bell Aircraft's proposed 25-passenger, triple-engine helicopter with markings of New York Airways.

Bell Reveals Turbine Helicopter Plans

Triple-engine craft to carry 25; New York Airways shows strong interest; military support is sought.

By Ewen Clark

Washington-New York, America, Inc., is negotiating with the Bell Aircraft Corp. for a 25-passenger, triple turbine helicopter which Bell says it can produce in 14 months or less if it can interest one of the armed services in the project.

Bell vice president for helicopters, Harvey Gaylord, told Aviation Week's proposed helicopter is not a paper machine. "He said, 'most of the critical parts of the design' already are fairly well proven by other work," Bell has done.

The Bell craft, which would fly at 120-125 mph, is designed with the Lycoming T55 turbine engine as used but could take the more powerful General Electric T56. The present T55 is rated at 770 horsepower and the G model will be sold at \$90,000. The Bell machine would fly with the engine's derived power from military requirements.

NYA President Robert L. Cummings, Jr., who has kept a close watch on helicopter development here and abroad

for some time, indicated he feels the Bell proposal may be the answer to the search for a machine that will operate with direct costs somewhere in the vicinity of 10 cents per available seat-mile.

Gaylord, Cummings and members of their staffs held talks—described as "the early stages of negotiation"—in Bell's office here last week.

Advantages Listed

The new helicopter would include three advantages:

- A very high rate of useful load to cargo weight compared to existing helicopters because of its turbine engines.
- A turbine winging, direct lift-off so much as a piston engine can deliver the same horsepower.
- Greater safety. One engine could fail completely, and the aircraft would still have satisfactory power.
- Reliable maintenance. The Bell helicopter has two pilots, placed at right angles at the extreme front and rear of the craft, making the pilot/master center of gravity much easier to control

than it is in the single-engine configuration.

- Easier maintenance. The three engines, gears, rotor heads and the drive shaft—which is located outside the passenger cabin—are easily accessible. External fuel tanks and the lack of a tail rotor also decrease the maintenance problem and increase safety.

Bell's machine would have a 70-mile economical range. For all practical purposes that means an actual endurance of about 125 miles. On a 50-mile trip between airports or from an airport to a suburban heliport, an operator is required before the return trip can be made, and there is a safety fuel reserve of around 20 or 25%.

NYA's Views

The relatively young New York Airways still operating with a bare public service job from the government, hopes to use the helicopter point in 1960 (AW May 5, p. 70).

President Cummings says that equipment still is the commercial helicopter operator's major problem, and he regards the Sikorsky S-55 as his new and the 12-passenger S-55 as he will get this year in stop-gap service.

Cummings announced about a year

ago (AW May 23, 1955, p. 107) that he considered it the only helicopter available for successful high-frequency schedules. At that time he had vetoed down his idea of the ideal short-range helicopter to 10 passengers. Now Bell says its machine could carry 25.

NYA now operates an over-the-horizon shuttle service between La Guardia, International and Newark airports, as well as service to points in New York, New Jersey and Connecticut.

Cummings would like to replace the taxi-like, cash-for-hire service with heavier schedules on which "you would load them like a streetcar" and have them leave every five minutes. He is confident that work, frequent, reliable service would bring such a demand for helicopter service that innovation could be done away with and provide more competition for further innovation.

NYA, which announced the first regularly scheduled helicopter passenger service and the first scheduled helicopter freight service in the world, has taken a pioneering look at all the existing and proposed helicopters it could use in this country and in Europe in recent months, and has kept in close touch with the other operators' needs.

Jack Galichman, NYA's operations manager and chief engineer, has flown most of them. He and Cummings agree that the Bell proposal is the most promising yet and Cummings believes there would be an immediate commercial need for up to 200 of them.

But both NYA and Bell agree that commercial helicopter operators will not get the 25-passenger craft "or anything comparable to it" without national help because of the high cost of development.

Bell calls the proposed helicopter "a

component of what the commercial operator needs and what the military needs" in a turbine rotor.

Bell's Gaylord points out that the advantages to a commercial operator—a good useful load/weight ratio, low maintenance cost and, most, higher degree of safety and stability, etc.—are the same ones the military wants, and that the larger the civilian helicopter fleet, the larger the reserve "fleet in being" if war comes—either for direct military use or for civil defense transport and rescue. Gaylord pointed out that the helicopter would not have been the basis of the Korean war had there not been both civil and

military demand for and development of it.

Gaylord believes that such new big things on more problems involving capacity and return will progress to the point that some would not be a cargo problem, by the time for 25 passenger aircraft rolled off the production line.

As for production date, Gaylord says the armed services could have a certified 15-passenger Bell engine in three years or less if they would allow some of the first production to go the commercial operation.

If such an arrangement is made, NYA is quite ready to be the first customer in line.

Initial F.1 Sale Reported by Frye

The newly-developed Frey Corp., of Fort Worth, Tex., announced last week that it has received initial orders for an short-haul, four-engine F.1 transport (AW Sept. 26, p. 100) from two Alaskan airlines.

The announcement said Northern Consolidated Airlines, Inc., of Fairbanks, has placed an order for three of the large-capacity aircraft and taken an option on two more. The other three have been ordered by Wren Alaska Airlines, Inc., of Fairbanks.

Jack Frey, company head and former president of Trans World Airlines, said he hoped to have the prototype of his "DC-1 replacement" aircraft flying by the end of the year with initial deliveries beginning in mid-1957. At present, final work on the aircraft is being completed.

Frey declined to reveal the purchase price stipulated in the contracts with the Alaskan airlines but said final

specifications, performance and operating costs will be announced within "the next three weeks."

He said the F.1, which has been formally titled the F.1 Sedan, will be offered with either fixed or retractable landing gear and in four different configurations:

- All-props.
- All-jet engines.
- Cargo-passenger.
- Experimental.

Initial specifications for the aircraft called for a cruising speed of 190 mph, passenger capacity of between 50 and 70 persons, a normal gross weight of 30,000 lb and a takeoff distance over a 50 ft obstacle of 160 ft.

Shortly after the formation of his company, Frey also announced that the F.1 would fly at approximately 5500-6000 ft. Power for the aircraft will be supplied by four Pratt & Whitney STM-C Wasp engines.



NEW VERSION of Frey transport has new windows for "Transonic Louvers," differs from original proposal (AW Sept. 26, p. 100).

reputation seems...character is!



A reputation can be purchased or promoted.
It may flower fleetingly... and as fleetingly disappear. Character is what we are...
and what we are evolves slowly and surely through the years.
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FRENCH ROAD, UTICA, NEW YORK

Traffic Control Called Critical Problem

By Pablo Sorens

Chicago-Orlando methods of air traffic control and scheduling airports are two of the most critical problems facing civil aviation today, according to airline pilot safety experts who met here for the Air Line Pilots Ass'n's fourth annual Air Safety Forum.

They said the situation is "not only a safety problem but an economic one as well" and they ignored ALPA into stepping up its air safety activities to an all time high.

T. G. Lonsky, head of ALPA's Engineering and Air Safety Department and "the industry's representative and its recognition of the value of the airline pilot's contribution has also contributed to the need for ALPA's safety activities to expand."

ALPA has over 2,500 pilots actively engaged in air safety work, ranging from incident investigations to the development of flight aids, he said. It is working with 26 major organizations on an advisory and representative basis. The association has its aircraft evaluation committee currently studying the Boeing 707, Douglas DC-7C and DC-8 and Lockheed Electra and 164WA.

Expansion Needed

"Even the broad program," G. N. Sorens, ALPA president, said, is going to have to be expanded and accelerated because the pilots' obligations go beyond mere job performance and must include assumption of active participation and responsibility in aviation planning, research and development to provide the tools with which to work under the highest standards."

The more than 150 pilot, industry and government experts were presented the following five-point program aimed at achieving today's growth problems:

- A more efficient utilization of air traffic control on the ground and in the air
- A planned airport expansion and development program to meet the jet age
- Better visual and navigational aids, such as approach lights and runway markings, for all weather flying
- Airborne radar and proximity indicators for weather and collision warning
- Cockpit instrumentation that will give the pilot a precise indication of a plane's position at all times

A six-member panel on Radio-Trans Air Traffic Control, Responsibility-Present and Future, agreed that air traffic congestion is a common problem but designed on the order in which pilots and operators should be approached.

Capt. J. D. Smith, fourth chairman

and an ALPA airport air safety chairman, called on the Civil Aeronautics Administration to fully accept its primary responsibility for effecting traffic control. He said "we have nine years ago to substantially handle today's volume of traffic but, sadly, as you can state that this long-range approach has been adequately implemented."

The existing dilemma is not due solely to lack of equipment, personnel or a combination of both, Smith said. Improved operations efficiency and safety can be attained, he said, by making maximum use of available tools and interior relief is essential until the Common Rules can be realized.

"The long-range solution should have the basic requirement permitting expansion and orderly transition. We have learned from experience that we cannot go directly from one system to another overnight," Smith stated.

Smith noted the point that before action can be any, ultimate solution there must be common agreement among all classes of users as to "what is the capacity they want the future tool to control system to have." This question was answered by Capt. S. F. Smith, traffic control expert of the Air Traffic Control Ass'n. With acceptance of 12 operational requirements he proposed, prototype hardware leading to an automatic air traffic control system could be developed within one year, he said.

Among these requirements were the merging of job and status types in the landing sequence with no reduction in the landing rate; 60 landings and

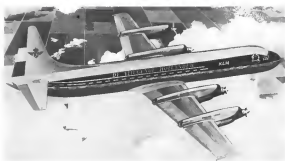
60 takeoffs per hour on dual runways, full noninterfering use of airports at close together as in the New York area; allowing flights to climb, cruise and descend within each plane's best performance range; job must not be held below 20,000 ft except in emergency; ability to handle aircraft that do not have the airborne equipment most favorable to the system; the new system must provide operational advantages in proportion to the number of equipped aircraft and must not suffer a loss of capacity or efficiency on existing stations.

Te-Is With SAGE

Smith contended that these requirements can be met with procedures that will be operationally acceptable. He said he thought the electronic hardware needed to implement such an operational philosophy could be built quickly within practical limits of cost, weight and technical complexity. SAGE specifically required a system under development from SAGE, the \$3 billion USAF air defense Semi-Automatic Ground Environment project under consideration for dual service as an air traffic control system. However, Smith said his proposed system could be considerably more to the SAGE defense system and thus make use of elements of SAGE to meet objectives.

In this same vein, David S. Little, operations expert of Air Force and Navy, proposed a widening of CAA air traffic control and Air Defense Command agreements. He said there is no reason for not integrating the requirements of air defense with those of air traffic control in order to provide both with maximum economy of all radar equipment and personnel expenditure as critically complex electronic computers.

Capt. L. S. Lightner, chief of the USAF air traffic control branch, declared that the Air Force's whole program is to go in the direction indicated by Little. He stressed separate requirements that the Air Force was seeking to take over by shifting fully. "The Air Force does not want to control civil traffic," Lightner said. USAF domestic handling of traffic controllers is necessary to help provide a reserve of personnel needed for existing accidents. He said that where there is sufficient U. S. civil traffic not within installations, USAF wishes the CAA to man and operate the facilities. What USAF would like to do, he said, would be to have more pilot use of traffic control personnel.



KLM Orders 12 Electras

KLM Royal Dutch Airlines announced an order last week for 12 Lockheed Electra (shown in dash above with KLM livery) at a cost of \$10 million. The four-engine transports, powered by Allison T81 (T-80) engines, are scheduled for delivery beginning in 1973.

Cargo Airlines Win Mail Rights

Washington-St. Louis and the Flying Tiger Line won a five-year extension of their operating authority in the Civil Aeronautics Board's decision on the east coast portion of the airfreight market case. The Board also decided to allow the four domestic cargo airlines to run, with without airbills.

The CAB decision extends Flying Tiger and Sky's operating authority to air mail and express for the five years, although the carriers, along with Riddle Airlines, were previously authorized to carry express mail.

Riddle and American Air Express and Imperial Co. also get an oral authority for the first time, although both were approved for express service when they were contested for five years in the north west portion of the case, decided last November. The new oral authority is granted for a one-year experimental period for all four carriers.

The mail route produced a tight decision on the CAB, which acted unanimously on the trial of the case. The experts determined that the Board has the power to issue a mail certificate which excludes express and decided that there is a public need for mail service under those specific conditions.

Following out that the Postmaster General strongly supported the cargo carriers for mail service the Board said that availability of the capacity of the cargo lines will add flexibility to postal

operations and will be the department's job of handling the mail carrier.

CAB member Harold D. Dewar voted with the majority on the mail route, but he attached a statement in which he emphasized that he regards the grant of oral authority for one year strictly as experimental and test period to gather evidence for future argument. Member Chas. Gorman dissented on the mail authority. He said he cannot understand the carriers, and he doesn't think the cargo carriers will provide the service the Post Office needs.

The Board decided to renew the cargo carriers' certificates for five years instead of the seven years recommended by the examiner. The shorter period was favored as a more realistic view of Sky and Tiger's past profitable cargo operations and the carriers' undeveloped aspects of their services.

The authority to carry mail was limited to one year because the CAB held it is premature in a new and untried field, and a one-year trial will test the soundness and value of the experiment.

The CAB also disagreed with the examiner's recommendation that a restriction be placed on the carriers' authority to make operational stops at all time points.

A limited number of assigned cities were restricted for domestic-type service.

The Board rejected examination that each carrier line be protected.

Flying Tiger Line was authorized to operate between three groups of cities: Los Angeles, San Diego and San Francisco-Oakland; Portland and Seattle; Minneapolis-St. Paul, Salt Lake City and Denver; Des Moines and Omaha; Kansas City, Chicago, St. Louis, Cincinnati, Cleveland, Toledo, Detroit, Grand Rapids, Milwaukee, South Bend and Chicago; Albany, Indianapolis, Buffalo, Rochester, New York, Newark, Philadelphia, Hartford-Springfield, Providence and Boston.

Service by Flying Tiger on a demand basis is authorized for Salt Lake City, Denver, Omaha and Des Moines. Service by Pioneerair, Alorair, Reberair, Alaska, Toledo, South Bend, Grand Rapids and San Diego can be furnished by truck to the nearest regularly served airport.

Sky is authorized to operate between: Los Angeles, San Diego and San Francisco-Oakland; Phoenix, San Antonio, Houston, Fort Worth-Dallas and Oklahoma City; Wichita and Kansas City; Louisville, Tulsa, Knoxville, St. Louis, Indianapolis, South Bend, Cincinnati, Dayton, Columbus, Albany, Cleveland, Toledo, Detroit and Chicago; Omaha, Pittsburgh, Richmond, Baltimore, Washington, Wilmington, DC, Philadelphia, New York, Newark, Hartford-Springfield, Providence and Boston.

Colo. and the Chamber of Commerce of Colorado Springs, Colo., have its address as the Liberty screen cast.

Radio Airliner on telephone to New York C-119 aircraft from Argent Airway Corp.

Phone Aerial Service authority to use Canadian registered Canon PWT-55 CF-100 to conduct airborne geophysical exploration in the United States on a general contract basis, until Sept. 1, 1976.

Flying Tiger Line as corruption to perform instantaneous charter flights for the Communist Social Club, Club MacMonie, American Social Club, Bureau of Aeronautics, American Airmen, American Flying Club, American Air and Desert Thermal Flying Club subject to certain conditions. Application to perform a flight for the National Education Law, was denied.

Codeva Airlines authority to suspend service over the route between Anchorage and Castelli, Alaska, until 60 days after decrease in the Inter-Alaska Transportation CAA.

AFFECTED

Agreements involving Delta Air Lines, National Airlines and various other carriers relating to intercarrier agreements.

Agreement between Railway Express Agency and Fidelity Union relating to the transportation of air cargo.

Introduction: Richard A. Schreier, New York Academy of Sciences, New York City; Donald C. Carr and Robert C. Godet.

白喉杆菌毒素

Frontier Airlines' performance reported on Schedules A and B of CAB Form 41 for the fourth quarter of 1953 withheld from public disclosure until the final schedules are filed so the time for filing such schedules expires, whichever occurs first.

Applications filed by Trans World Airlines, Western Air Lines, Continental Air Lines, United Air Lines, Frontier Airlines, Bonanza Air Lines and the City of Phoenix consolidated into the Phoenix service case.

Appleton, filed in Central Airlines, Inc.; Airway, Great Airlines, City of Liberal, City of Cayman, City of Road, City of Burger City of Dikinson City, County of Fresno and the City and Chamber of Commerce of Lasat, and the City of Anadito consolidated into the Liberal common case.

THE UNIVERSITY

Application of the Chamber of Commerce at Hickory, N. C., for service to Washington and Atlanta, since the applicant has failed to express an intent in prosecuting the application.

DESIGN

Methods for consultation with the respective Disaster relief case of agencies from Red by American Air Lines, United Air Lines and Western Air Lines.

Applications of Boreman Air Lines and the City of Palm Springs, Calif., for exemption authority to allow Boreman to serve Palm Springs while service by Western Air Lines is required by a state.

Rite-A-Ride application for emergency security to operate between Burbank, Calif. and Las Vegas. Now under a contract with The Showboat, a club and hotel in Las Vegas.

COCKPIT VIEWPOINT

By Capt. R. C. Revere



Ground Radar, Friend or Foe?

Incidents occasionally arise which cast a bad light on ground radar. To us and the people who use it. The U.S. GCA had at a few years ago an example of this. Then there was the debate (just settled) as to whether GCA observation was mandatory on certain instrument approaches. More recently, there have been cases where radar was cast in the role of an electronic detective providing evidence leading to pilot malfeasance procedures.

The CIA has given assurance that spray is not the intended use for radar. On the other hand, regardless of the source of such confidence, confidence in lawlessness, regardless of the source of such confidence. And this is understood by pilots. No one is interested in blindly following a lawbreaker. But there is a vast gap between deliberately violating a rule and exercising the judgment needed in the cockpit of a modern airplane in today's traffic.

Here is a quote from a letter which illustrates this situation. The letter was addressed to the pilots of a U. S. airline and concerns an incident involving one of these pilots:

Order vs. Reaction

*On Thursday, January 17, 1956 a pilot was informed by a CAA Safety Agent that he had conducted his approach below the minimum altitude below altimeter reading reference on his approach to San Francisco International Airport. The basis for this conclusion on the part of the CAA was that he was under radar observation and was observed to be at 180 feet when he reported the approach lights in sight. He was further contacted for his failure to report the runway lights in sight.

"Assuming the airplane was descending at the rate of 500 fpm, the lights were observed at the 280 foot maximum and the pilot had only descended 20 feet when the radio transmission was made, the pilot possesses a reaction response that makes all electronic computers obsolete. With half of this ability Telly the Kid would have dominated the arm wrest of the Missouri River."

This, as you can see, is not a clear cut case of an illegal flight procedure. It is a case of somebody on the ground trying to tell the pilot what he saw—or didn't see. It apparently ignores chambering lag, liveliness and legal, learnable error. Furthermore there is no regulation which binds a pilot to report any kind of lights-*et hoc* sample here a courtier extended to help expedite the approach of the next aircraft. An IFR clearance doesn't even have to be expedited until the plane is in the ground.

Let Pilot Steer Plane

Matter of fact we do many things in the air out of courtesy. We make short turns, keep a high speed, "cancel IFB," as soon as possible--all to help the next in line--put us you were to the rear of an elevator or do something other little things for your fellow man. But if we're going to get disbarred for being polite why bother?

Plants understand that observation of order in actual operation is necessary in order that information may be gathered without its setting up more efficient traffic control procedures. Indeed, we welcome any assistance that is available and allow many flights to be completed. But the thousands of variables, related expenses, by which an airplane is flown, as well as the constraints used, cannot be expounded in detail to every individual in existence.

If it develops that overzealous CAA agents are attempting to restrict radio information, i.e. to steer the airplane from the general, then the use of radio may be that much harder to 'sell' to pilots.



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The advertisements in this section include all employment opportunities in aerospace companies, submitted within 60 days after publication.



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REPLY TO:

Our company has a variety of part-time positions available in the field of aerospace engineering and design. We are seeking individuals with a minimum of a Bachelor's degree in a related field.

For an interesting job in aerospace, please send your resume to: **AVIATION WEEK, 340 W. 42nd St., New York, N.Y. 10018.**

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Civil Service Opportunities Selling Opportunities Wanted Selling Opportunities Offered

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Employment Agencies Employment Services Labor Bureau

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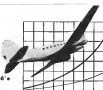
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